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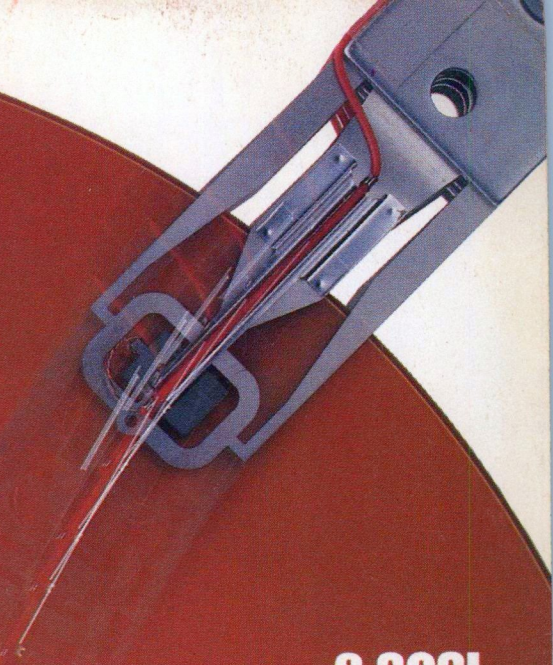
ISSUE 5



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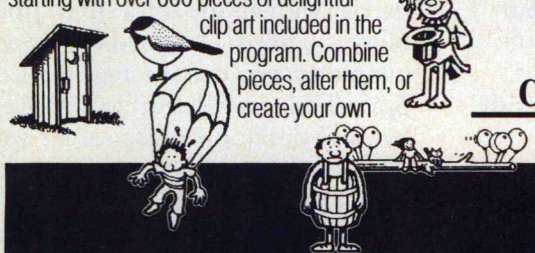

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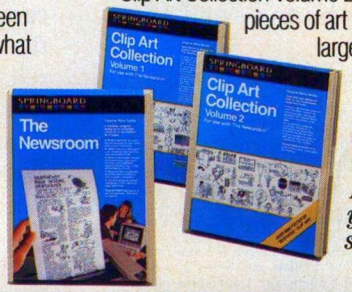

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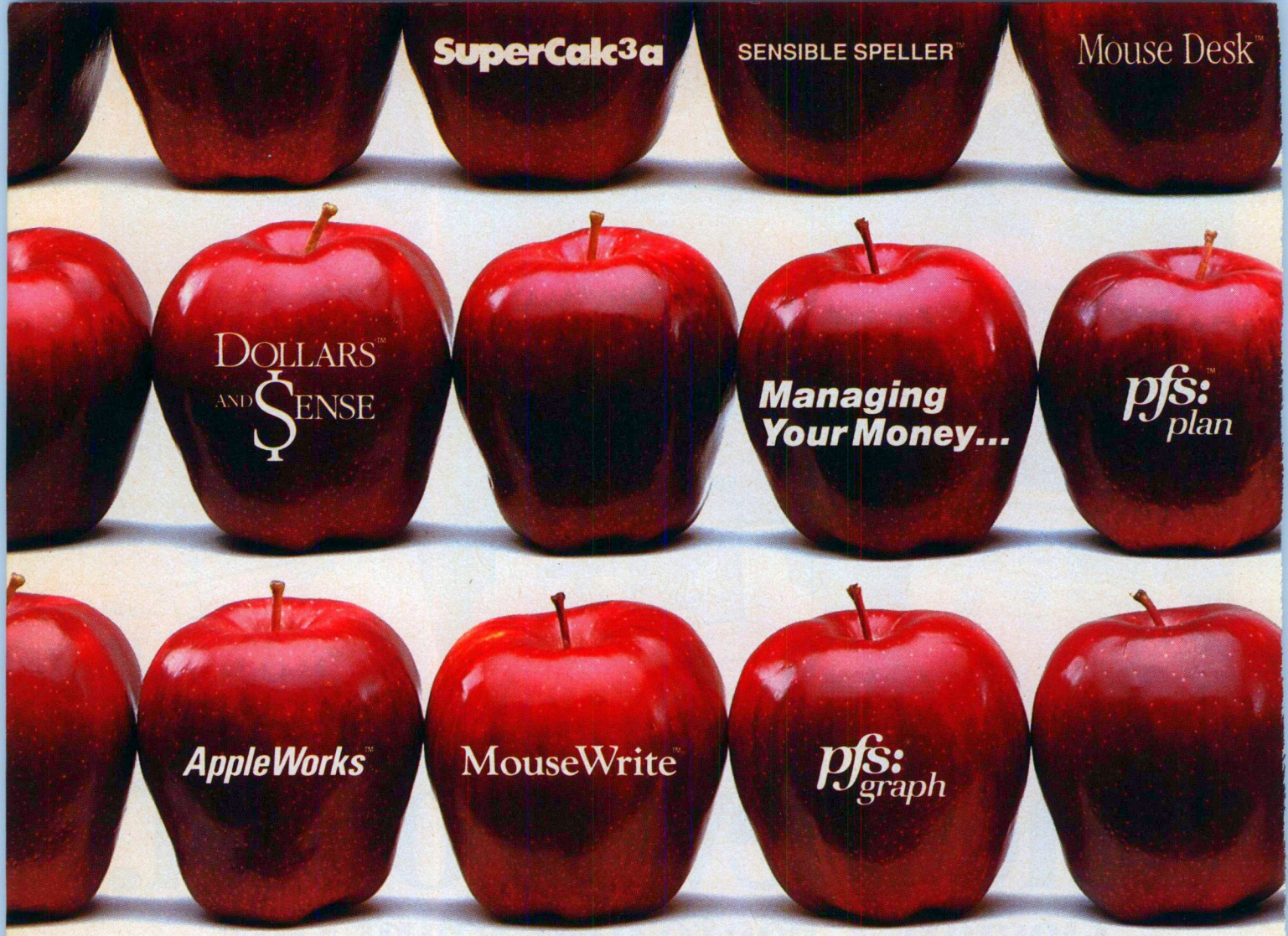

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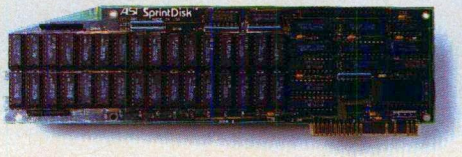

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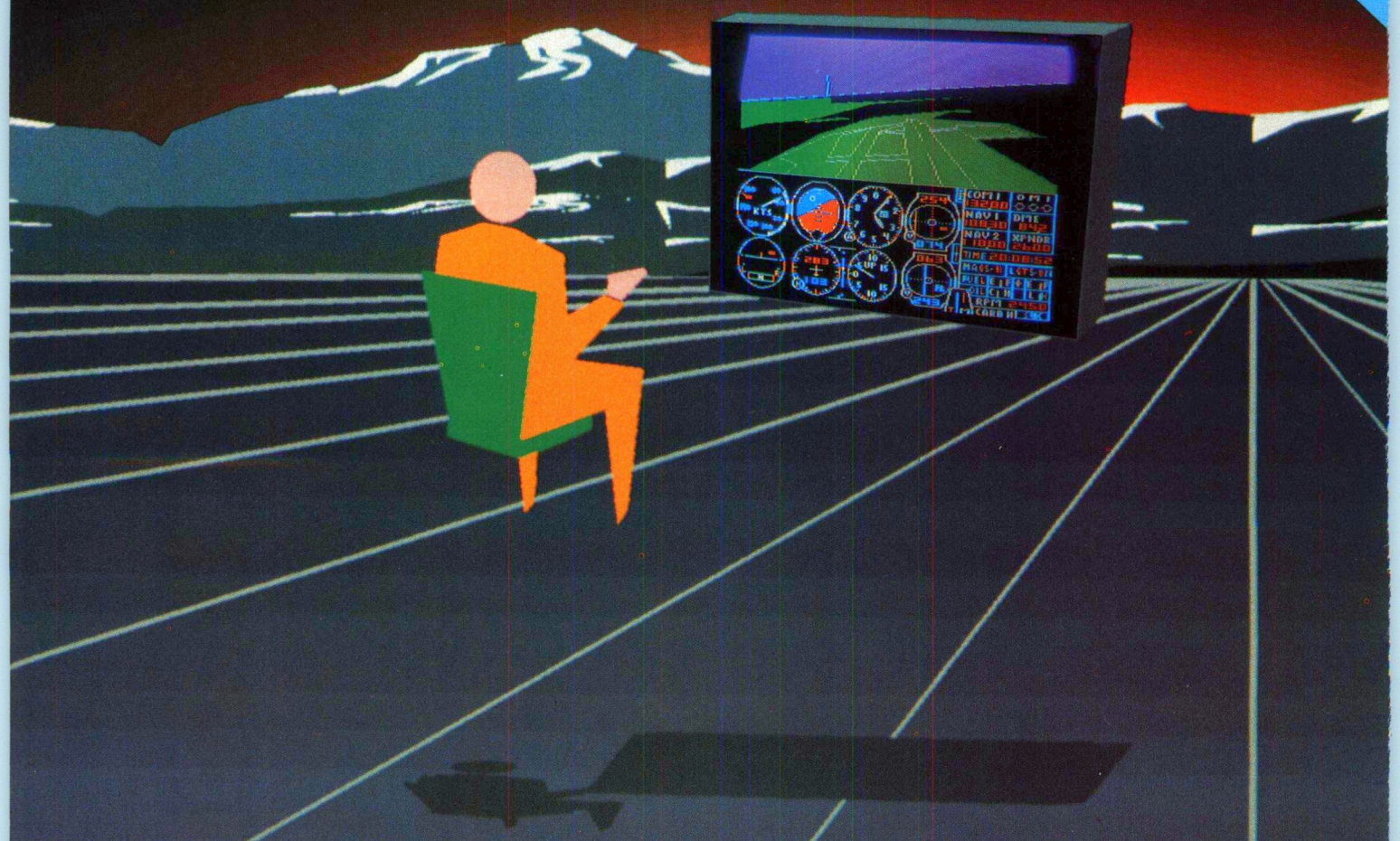

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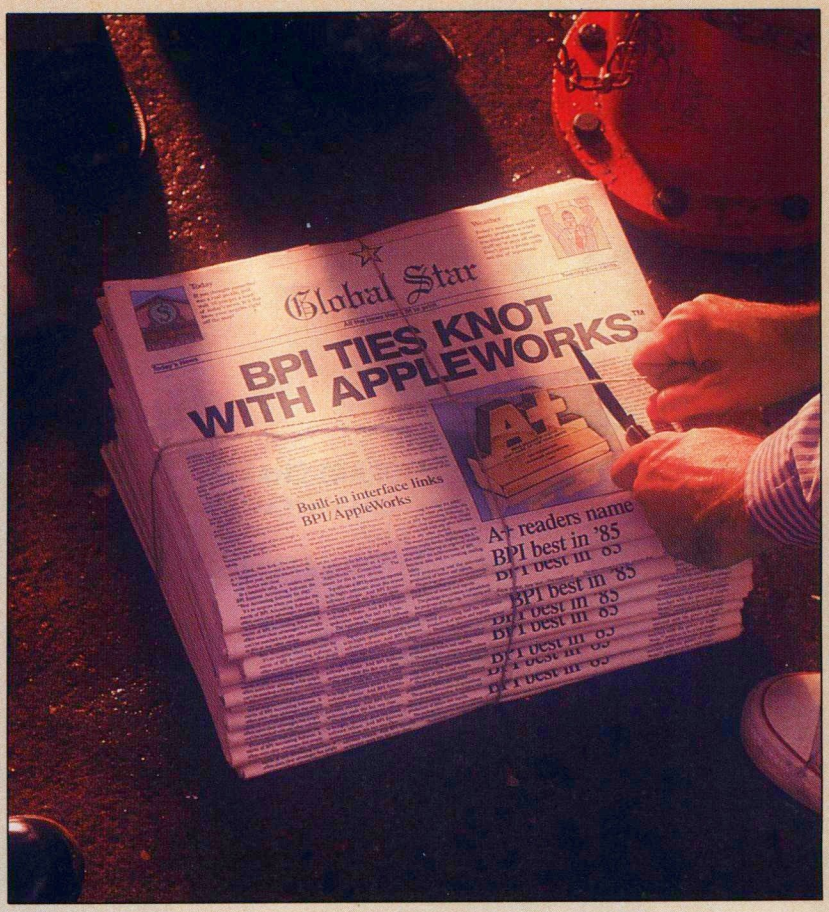

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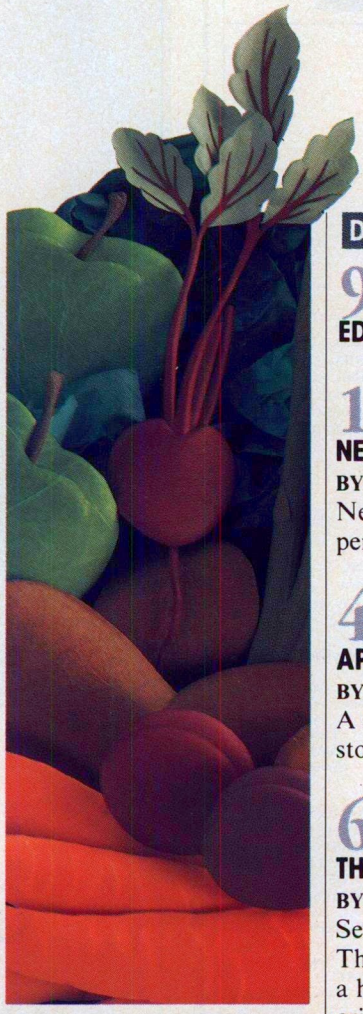

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With the coming of spring each year, gardeners' thoughts turn to the magical combination of seeds, soil, rain, and sun. Gardeners have been doing this for centuries, but now a 20th-century ingredient can add to the ancient springtime rite. This review explores four gardening products: Plantin' Pal, The Gardener's Assistant, The Ortho Personalized Plant Selector, and Design Your Own Home Landscape.

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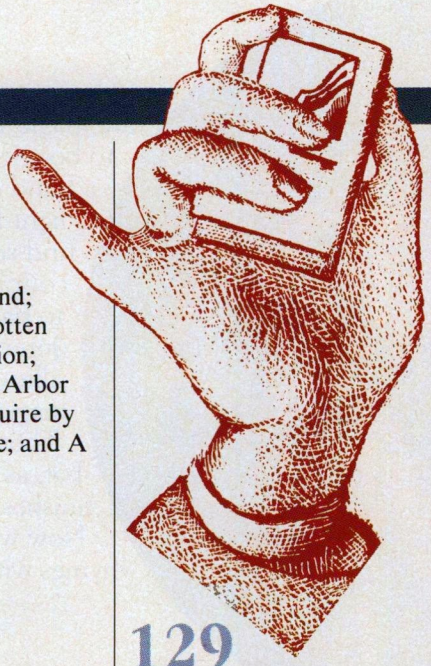

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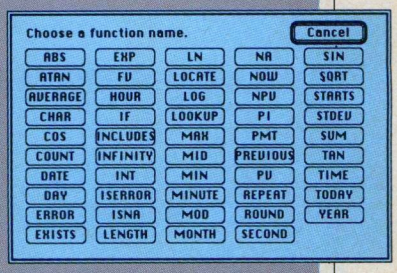

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(No I.D. required for half-elves.)

When the Going Gets Tough, the Bard Goes Drinking.

And the going is tough in Skara Brae town. The evil wizard Mangar has cast an eternal winter spell. Monsters control the streets and dungeons beneath. Good citizens fear for their lives. What's worse, there's only one tavern left that serves wine.

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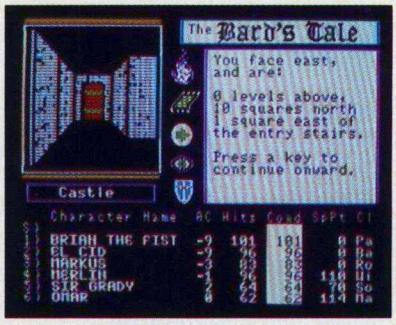

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ILLEGAL COPYING IS RAMPANT

I recently moderated a panel on software piracy. I wanted to participate in the panel because I was curious to see if attitudes have changed after all the media attention to the illegality of copying software. Well, I am discouraged to report that many people still think they are justified in copying software at will.

Now, I am sure many of you join me in condemning software copying, but you seem to be in the minority, as far as I can tell.

The audience constituted an interesting mix of businesspeople, educators, and kids. Every single person raised a hand when one of the panelists asked who had ever copied software. No one seemed the least ashamed to admit their illegal deeds. In fact, all felt fervently justified in their actions. I wonder if these people would so easily admit to going into a computer store and physically stealing a software package!

The reasons for copying are diverse and well worn. The businesspeople justified copying software for three reasons: because they want to let friends see if they want to buy the product, because they need backup copies, and because they don't think software is worth the price.

My response was as follows: First, why should you need to let your friends check out copies of your software when they can easily look at a demo disk at a computer store or pay a small fee (often $10 that counts toward the purchase) to buy a demo disk. Second, everyone needs backups in case of disk crashes, but no matter what, I feel copying software is illegal. If you need a backup, most companies provide them for the cost of the disk and handling. If a company does not offer backup disks and the product is copy-protected, I suggest you think twice about the purchase. Third, if you don't think a piece of software is worth the price, that does not give you the right to go out and copy it. It is the same as buying anything; if you don't like the price of the car, the vast majority of you don't go out and steal the Porsche of your dreams.

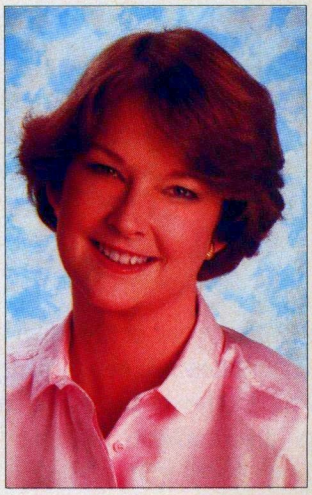
The teachers' excuses for copying were the same as usual (David Thornburg covered this topic in his March 1986 "Learning Curve" column, "What's Turning Teachers into Thieves?" pages 93–94), and I won't belabor the point too much, except to say that software developers are not in business to fund the education system—they are in the business, like anyone else, to make a living!

Last, but certainly not least, are the kids, who had numerous reasons for copying software, all of which boiled down to price—the software they wanted was too expensive. The car analogy works well again here as a response.

So where does this leave us? Right back to ground zero. People are clearly still copying software. It is also clear that manufacturers are going to continue to try to thwart these thefts with increased copy-protection and, ultimately, prosecution. My solution is to bring illegal software copying to your attention often enough that you realize that copying software is not OK. As with any problem, we need to keep a dialogue going, so please write me with any ideas on how to solve the problem of software piracy. +

Maggie Canon

MAGGIE CANON/ **EDITOR IN CHIEF**



My solution is to bring illegal software copying to your attention often enough that you realize that copying software is not OK.

What the Experts are Saying About RamWorks II!®

"In an informal competition called '640K vs. 640K' AppleWorks running on a RamWorks equipped Apple IIe outperformed Symphony running on an IBM PC."

—InfoWorld

"AppleWorks wiped out Symphony... The competition was set up partly to show off another of Wozniak's favorite things, the RamWorks II memory expansion board from Applied Engineering . . ."

—San Jose Business Journal

"There are huge differences among the AppleWorks modifying programs sold with the cards. Without doubt, RamWorks II is the most powerful."

—inCider

"Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks. . . I like the product so much that I am buying one for my own system."

—A+ Magazine

"RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars... For my money, Applied Engineering's RamWorks II is king of the hill."

—inCider

As you can see, it's easy to tell who sets the pace in Apple memory expansion. In fact, if you read the competition's ads, you'll notice that many even claim to be as good as RamWorks. Some say they're "RamWorks compatible". At least they agree on one thing. RamWorks is the one they have to measure up to. But the truth is there aren't any substitutes for RamWorks.

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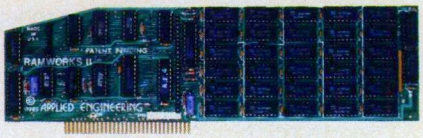

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Letters

CONTEMPLATING THE +

Dear *A+*: I am a happy user of AppleWorks and recently bought my first issue of *A+*. Being extremely impressed by the magazine, I wrote a letter to your subscription office with my payment to receive *A+* at home.

I created the letter with AppleWorks and was somewhat amused that I could not use the filename A+, as AppleWorks does not recognize the + in a filename. I had to type A Plus to get the job done.

Do any of you find humor (nobody ever claimed computer humor was actually *funny*) in the fact that the name of the best magazine devoted to Apple computing cannot be entered into the filename of an AppleWorks document? Thinking about these things is much easier than contemplating how to end world hunger and the threat of nuclear annihilation.

Michael Boo
Steger, IL

OVERCOMING OBSOLESCENCE

Dear *A+*: Regarding the letter "Obsolescence Looms" in your January 1986 issue, I had Mr. Collier's problem with my Vista V1000 DSDD 8-inch disk system. Vista had provided software support for Pascal 1.1 before going out of business, and I wanted to use the V1000 with Pascal 1.2. I also wanted to use the V1000 together with Applied Engineering's RamWorks card, which also uses versions of SYSTEM.ATTACH, ATTACH.DATA, and ATTACH.DRIVERS for Pascal 1.2 supplied by Applied Engineering. After much prodding, my Apple dealer acknowledged the existence of Apple's software product number A20015 "Apple II Pascal Device Support Kit," available on special order for $35. With the kit, I was able in an hour or two to accomplish my goal without any assembler programming and without any source code from Vista.

James A. Kirk
Westminster, CA

BUSINESSWORKS CORRECTION

Dear *A+*: We appreciate BusinessWorks' being included in your February issue's chart of new products for the Apple II (pages 68, 69). We do, however, want to point out a few inaccuracies. You stated that BusinessWorks works with the UniDisk 3.5 drive and Catalyst 3.0, which is correct. It also works with the ImageWriter II, however. Version 5.10 of BusinessWorks works with the Apple II Memory Expansion Card (and other RAM cards), thus eliminating the need for two UniDisk 3.5 drives. That release also works with Pinpoint from Pinpoint Publishing, Inc.

The other item I'd like to bring to your attention is that BusinessWorks was listed as just another module, along with Accounts Payable, Accounts Receivable, etc. Actually, the name of the whole package is BusinessWorks. It contains five accounting modules (General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, and Payroll) and the required System Manager. Each of these modules can be used alone, or they can work together to form a completely integrated business-accounting system.

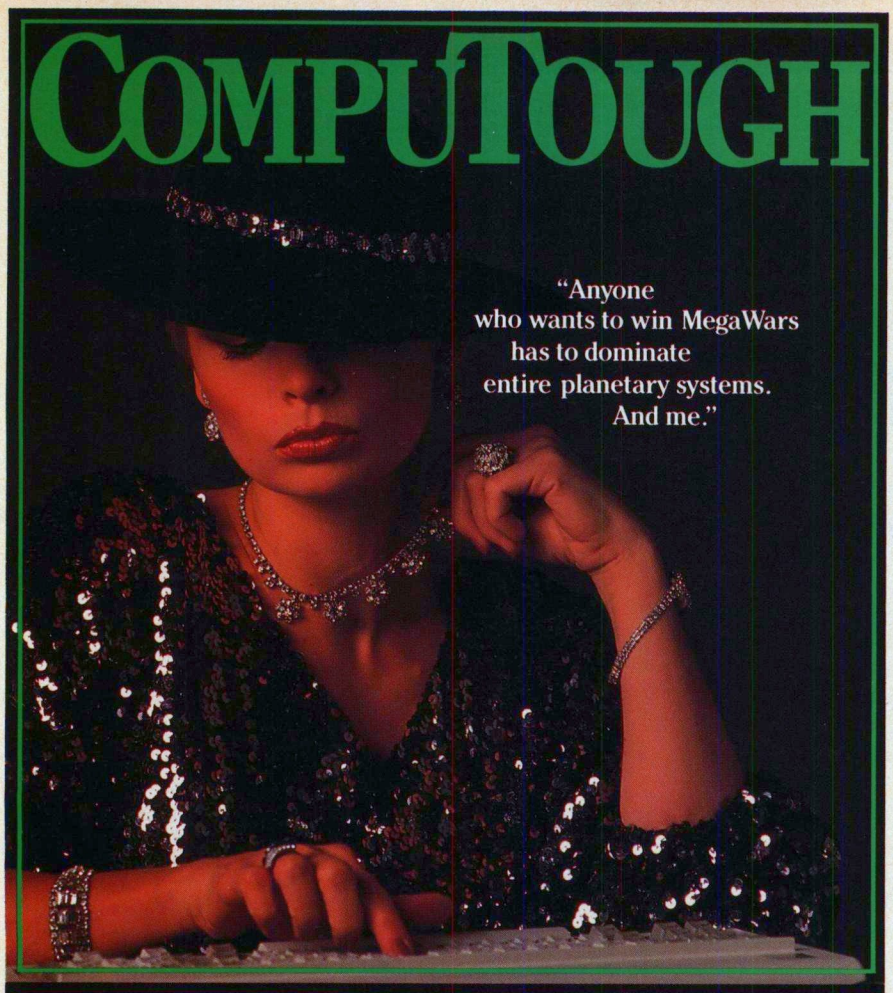
Joan L. Levers, Director
Corporate Communications
Manzanita Software Systems
Roseville, CA

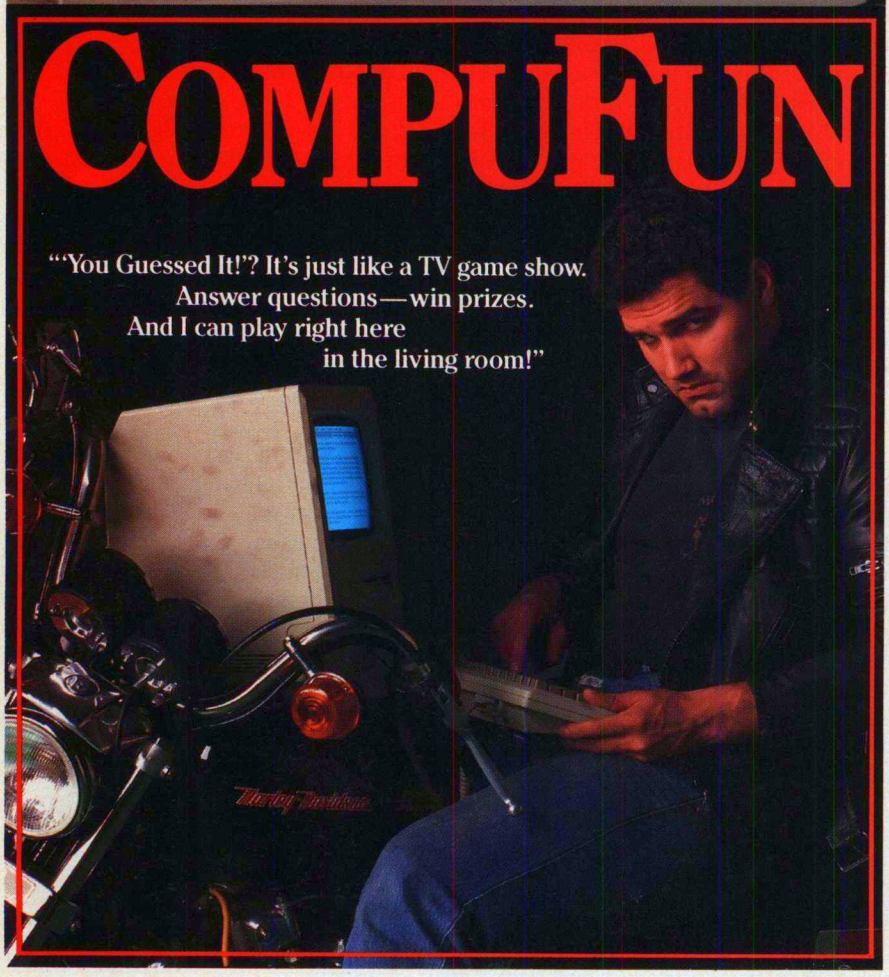
BASIC DEFENSE

Dear *A+*: David Thornburg's rather contrived attack on BASIC as a computer language (*A+*; January 1986; pages 79, 80) was way off base. BASIC was the first language that most of us learned, and it is perfectly serviceable. It started out as a cut-down version of FORTRAN, and the idea was that the beginner would learn the rudiments of programming with BASIC and later "step up" to the more advanced FORTRAN. Somehow, this idea got left behind, and BASIC was gradually upgraded into a useable stand-alone language. It isn't perfect, but it has a lot going for it as a first language.

Its very lack of structure, which the sophisticates find so lamentable, is what makes it appealing to the beginner. Some of the statistics programs that I wrote when I was getting started are long, rambling, and inefficient, but they still work, and by writing them I learned to do better. You can slop around in BASIC; you can start out without knowing how many variables you are going to need and toss in subroutines at will if you forget some steps—you can't do that with regional variables—but, of course, this kind of thing upsets the fussbudgets who want you to begin with meticulous lists and then proceed in order. A lot of us think you can learn that later, after you have had the satisfaction of getting your own programs to work.

The matters that Dr. Thornburg brings up strike me as nonproblems. Statements such as A = A + 1 used to be written, Let A = A + 1, and the Apple still accepts this form. If a novice is confused by the double meaning of =, I always advise him to write a definition as a Let statement. It might interest Dr. Thornburg to know that the verb *to be* in English also has two different meanings, but we seem to make the distinction between *being* as equality ("I am I.") and *being* as participation in a set ("The grass is green.") readily enough.





As for variable names, where is it written that they have to be fully explanatory? Names with one and two letters actually save time and don't cause that much confusion. (I assume Thornburg rejects ProDOS, because program names can be only 15 characters long without spacing, and so are always mnemonics, or gibberish, whereas in DOS 3.3, you had 30 characters and spaces, so you could write complete program titles). Accidentally using a reserved word as a variable name is no real problem. As soon as you list the program line, it sticks out like a sore thumb (as in Thornburg's example).

The real difficulty with BASIC is that it is interpreted, rather than compiled, so that BASIC programs with a high degree of iteration run very slowly, but this is not a major problem for many uses. BASIC is an excellent language to begin with and serves even the advanced programmer very well. And if you are getting seriously into programming, won't you, sooner or later, go to machine language anyway?

Stuart O. Landry Jr.
Endwell, NY

BASIC ATTACK

Dear *A+*: David Thornburg is absolutely correct in his denunciation of the shortcomings in Applesoft BASIC, but he failed to mention one of the most glaring errors, which is the improper interpretation of the FOR/NEXT loop.

Such a construct should be nothing more than a WHILE . . . DO loop in which the number of iterations is known ahead of time. But Applesoft BASIC treats it as a DO . . . UNTIL loop, so that the terminating test is made at the *end* of the loop, thereby guaranteeing that it will always execute at least once. An excellent example of how this treatment can produce inconsistent results follows:

```
10 LET ANSWER = 1
20 FOR I = 1 TO 0
30  LET ANSWER = ANSWER * I
40 NEXT I
50 PRINT ANSWER
```

```
10 LET ANSWER = 1
20 FOR I = 0 TO 1 STEP -1
30  LET ANSWER = ANSWER * I
40 NEXT I
50 PRINT ANSWER
```

These two programs are identical in scope, yet the first gives an answer of 1, and the second yields a 0. The

only solution to this problem is to add a special statement just prior to the beginning of every FOR/NEXT loop that emulates the terminating test and forces a bypass of the loop if the condition is true.

Eric P. Nagler
Santa Clara, CA

BASIC EASE OF LEARNING

Dear *A+*: David Thornburg's anti-BASIC article does a real disservice to the parents, students, and teachers who read your magazine!

The minor syntactical short comings of Applesoft BASIC that Thornburg ridicules are certainly no reason to ban the teaching of BASIC, as Thornburg seems to wish! Granted, BASIC doesn't provide the same kind of quick feedback to new learners that Logo does. Still, BASIC is much superior to languages such as Pascal when it comes to ease of learning. And, of course, LISP is not as easy to learn as its descendent—Logo!

It seems to me that BASIC critics such as Thornburg really are suggesting minor improvements to BASIC. Clearly, throwing out the language because of a few minor blemishes makes no sense at all!

Instead of concentrating on such minor details, Thornburg should accept the simple, not-so-horrible facts of life—BASIC is with us for good, and learning BASIC is *not awful*.

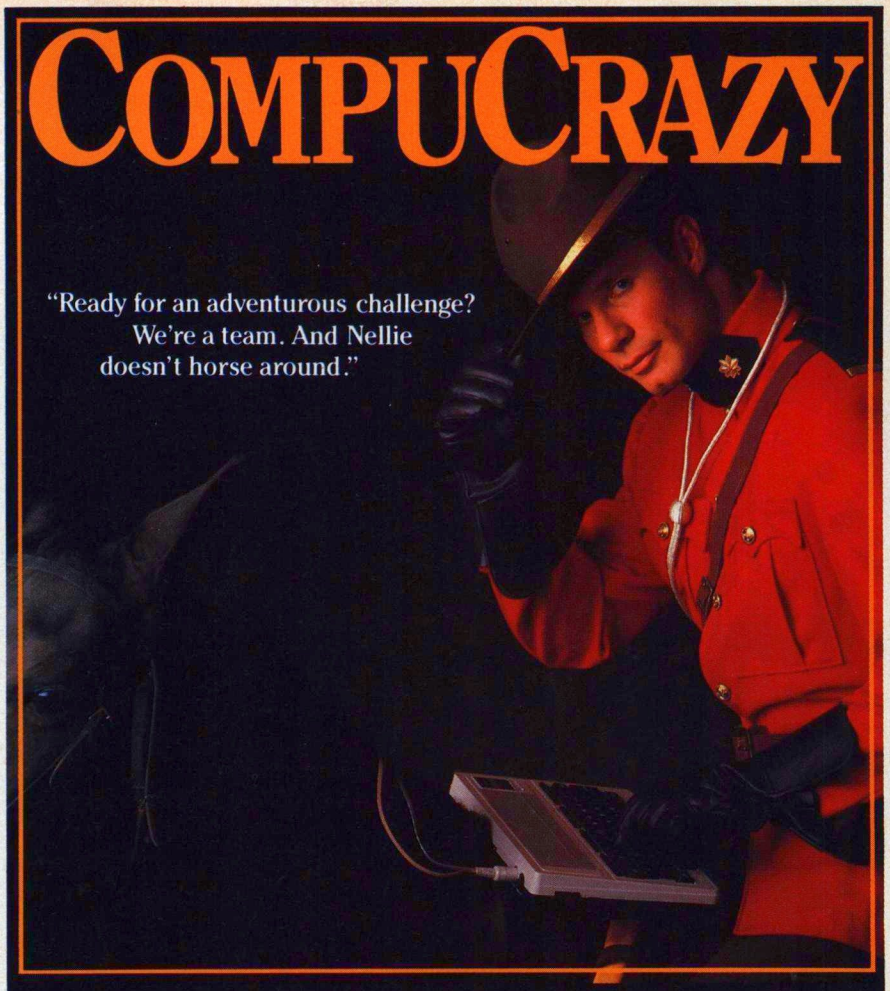
Computer-language censorship, which is what Thornburg's article is suggesting, should be kept out of our schools!

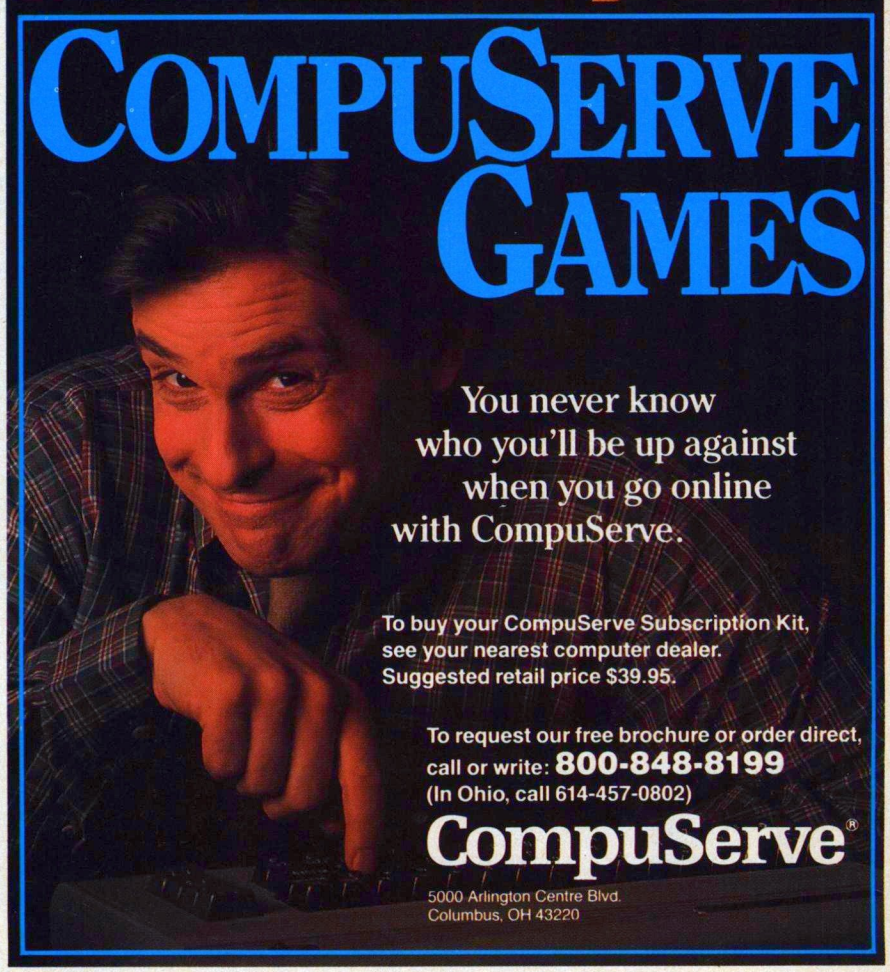
Mark Friedland
Director of Corporate Planning
Krell Software Corporation
Stony Brook, NY

ALL-MALE MANUALS

Dear *A+*: I am disturbed by what appears to be a continuation of manifest racism and sexism in the emerging field of personal computers. The four manuals that accompanied my Macintosh and ImageWriter did not depict any ethnic minorities or females using the hardware or software. The Macintosh manual contained some 24 photos with only white males or white male hands. Is there any explanation other than a complete lack of racial and gender sensitivity? Computers are supposed to represent the cutting edge of technology!

Dr. John Caruso, Jr.
Danbury, CT





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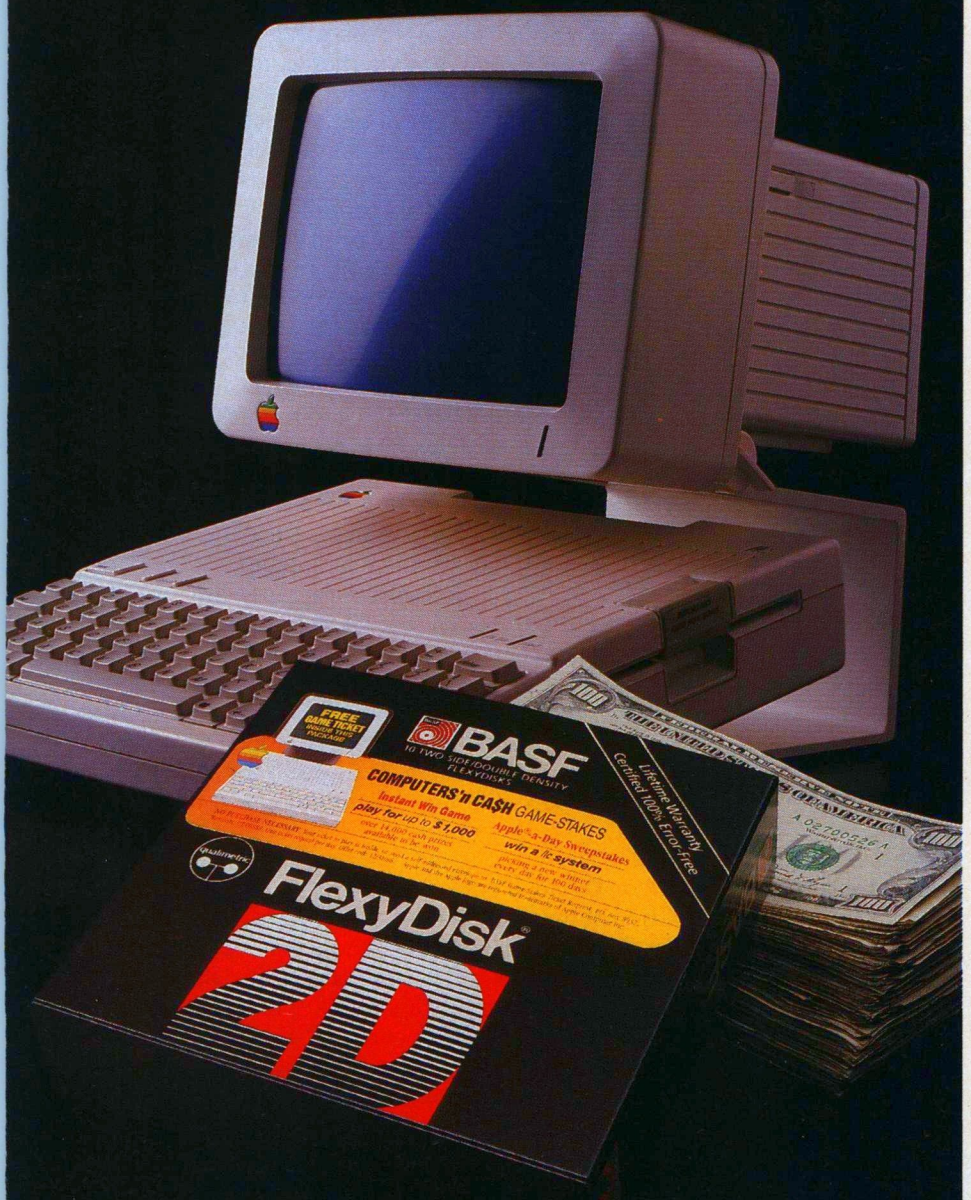

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CIRCLE 157 ON READER SERVICE CARD

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CHIP CONFUSION

Dear A+: Titan Technologies' Accelerator IIe most certainly does have a 65CO2 CPU, as the coprocessor chart in your December issue correctly stated. In your March issue, however, a letter to the editor by Timothy C. Benham of Seattle, Washington, headed "Misplaced C Proves Misleading," erroneously claimed that the Accelerator IIe has a 6502C instead of a 65CO2.

Actually, the Accelerator IIe has a 65CO2C chip. When the C is placed in the middle of the chip number, it stands for complementary metal-oxide semiconductor (CMOS). This particular chip is more reliable, runs cooler, has lower power consumption, and involves better overall technology than a 6502.

A letter placed at the end of the chip number indicates speed and often is omitted when speed is established otherwise in the text. An A means the chip is capable of running at 2 MHz, B at 3 MHz, and C at 4 MHz. Titan's Accelerators for Apples currently operate at 3.6 MHz.

Perhaps Mr. Benham is confusing the Accelerator II with the Accelerator IIe. Titan introduced the accelerator concept to the microcomputer industry in the spring of 1983 with the Accelerator II, which was designed with a 6502C chip to speed up Apple IIs three and a half times. The Accelerator IIe, an enhanced (65CO2) version for the Apple II, II Plus, or IIe, entered the market in the spring of 1984.

Robin F. Risser
Executive Vice President
Titan Technologies, Inc.
Ann Arbor, MI

CATALYST COST

Dear A+: In reading the article "Exploring the Apple II Desktop" (*A+*, March 1986, pages 34–41), I understand that Catalyst 3.0 is free with the purchase of the UniDisk 3.5 disk drive.

In late December, I purchased a UniDisk 3.5 disk drive, and no Catalyst was included. Did I misunderstand the article, or should I have received the Catalyst?

Hubert Parker
Pulaski, VA

We erred in our article—Catalyst 3.0 is not included free of charge with the UniDisk 3.5, as we stated. It is a purchase option.—Editors

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TEXTBOOK VS. SOFTWARE PRICES

Dear *A+*: As a small software publisher, I support David Thornburg's statement about improper copying (*A+*, March 1986, pages 93, 94), and we deliver our software in copyable form.

I would like to point out one error in your column that damages the force of your arguments, however. That is that although textbooks that cost $15 can be used for a whole year, year after year, and workbooks that cost $5 can be used for an entire year or at least a semester, it is extremely unlikely that an education program that costs three or four times as much will serve the needs of a child for as much as a month. And if the program records the data about each child's development on the disk, thus using it up, a school may need, instead of three workbooks (readin', writin', 'rithmetic) costing $15–$20 per child per year or semester, five or more programs per student in each subject, raising the cost per student into the area of $200 or more.

If we are going to manage the difference in costs for the schools and the need for survival of programmers, we must at least be accurate in assessing the costs.

Mike Firth
Dallas, TX

ODIOUS COMPARISON

Dear *A+*: In reference to David Thornburg's article in the March 1986 *A+* "What's Turning Teachers into Thieves?" I can understand your feelings about the thievery of any software. Your closing statement is what I object to, and I quote: "At least the junkie with the gun had the courage to look his victim in the face" was a disgusting comparison.

Your comparison to the teachers should bring every teacher who reads that down on you. I don't understand how you could equate an armed thief willing to take the life of someone to a teacher. I think you could have gotten your point across without that comparison.

As a writer you should be more responsible in what you write, and *A+* should be more responsible in what it prints.

I have been a reader of *A+* magazine for a couple of years and have always found the magazine to be of the highest quality—I guess everybody is entitled to one mistake.

My personal views on copying programs for distribution to other people so they don't have to spend the money is the same as yours, but I do not compare it in the same way.

Ronald J. Testa
West Orange, NJ

SHATTERED DREAMING

Dear *A+*: As a high-school teacher and a writer of commercially published educational software, I found Dr. Thornburg's article (*A+*, March 1986, pages 93, 94) comparing teachers who copy software to common thieves to be unjust, incorrect, illogical, and poorly written. I also find *A+*'s decision to publish it disappointing. The Apple computer family, programmers, and educators have a very close relationship. The majority of hardware and software in the nation's school systems relies on Apple systems. As this relationship continues and grows, it is necessary to understand it from the side of the users; the determiners of the success or failure of this relationship.

Software programs are not textbooks, as Thornburg would like to think. Textbooks cost less than $30 and are used daily. Software can run from $40 to $400 and is used infrequently. Budget constraints are a problem, as the author has stated. But "letting Mom and Dad know . . ." is an unrealistic solution. I am hard-pressed to secure enough desks, textbooks, and current materials for my students. What hardware and software the school has comes through fund-raising drives by students and grants awarded to fellow teachers.

The cure to Thornburg's "shattered dreams" will not come from teachers, no matter how much he wishes to insult and degrade them. We get that with every paycheck! Resourceful and caring teachers will continue to work for the best interests of their students, as they always have. A different approach to pricing and purchasing of software in education is needed to keep self-serving publishers and programmers happy. Arrangements such as leasing copy agreements to school systems—M.E.C.C. uses this approach—have proved successful.

It's time for Thornburg to wake up from his "shattered dreaming" and take a realistic look at the economics of education.

Peter J. Schaefer
Mechanicsville, MD

CIRCLE 195 ON READER SERVICE CARD

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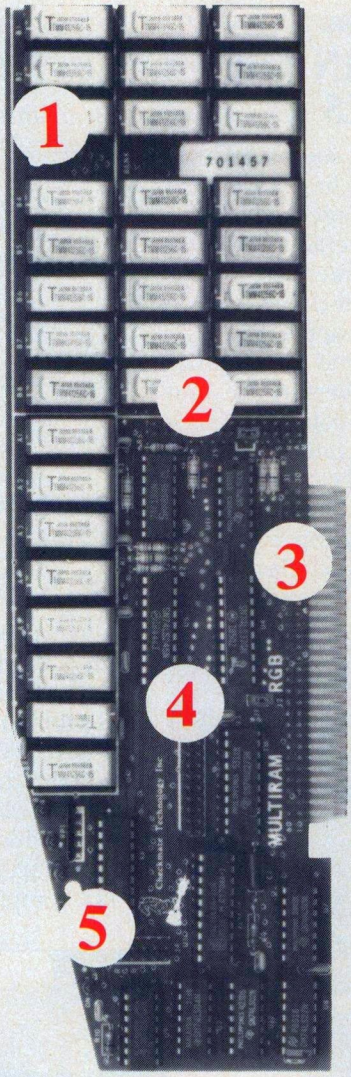

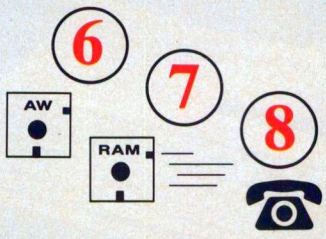

The Software

6. ***AppleWorks expansion software*** is included with MultiRam™ RGB to expand AppleWorks from 55K to 3,034K, the largest Desktop available. AppleWorks expansion software lets you • automatically segment and save large files to floppy • load all or parts of AppleWorks into RAM (even printer routines) for supercharged speed • easily use a RAM disk along with an expanded Desktop to store Pinpoint and Jeeves accessories for immediate response • create databases of more than 5,300 records vs the ordinary 1,350 records • create word processor files over 5,300 lines (more than 100 pages) • and show date and time on screen with any ProDOS clock and enter them into databases with one keystroke. And we're adding new features all the time.

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BY FREDERIC E. DAVIS

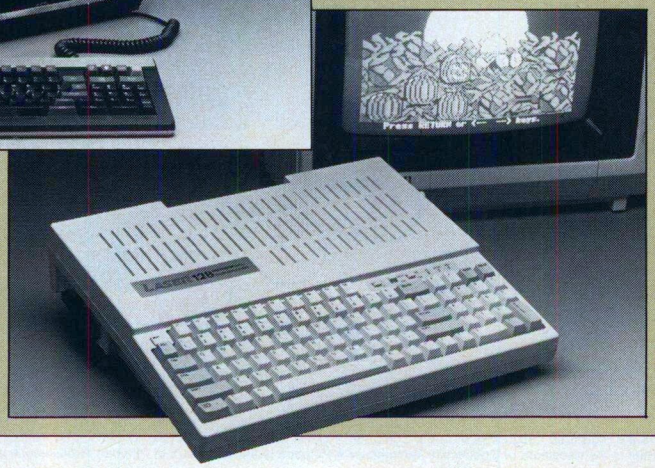
NewsPlus

A second generation of Apple II clones is emerging.

SEND IN THE CLONES

Apple was successful in forcing the first wave of Apple II clones, which appeared several years ago, off the market because it proved that clones (such as the Pineapple, the Wombat, and the original Franklin) were in violation of Apple's copyrights. Now, a second generation of Apple II clones is emerging that claim not to violate any copyrights.

The new clones that look most promising are the Franklin Ace 2000 series of Apple IIe knockoffs and Central Point's Laser 128, an imitation of the Apple IIc. Even Tandy is getting into the act with a split-personality clone that fits an Apple II emulator board inside the Tandy 1000 to provide both IBM PC and Apple II compatibility. We'll be taking a closer look at these copycat computers in next month's issue of *A+*.



THE MOST PROMISING-LOOKING CLONES ARE THE FRANKLIN ACE 2000 SERIES AND CENTRAL POINT'S LASER 128.

BEWARE OF 400K DRIVES

Owners of Macintoshes with 400K drives are beginning to face some serious problems. Although the new 800K drives can read both diskette formats, the older 400K drives, which are still being sold with Macintosh 512K computers, cannot read the format of the new 800K drives. When you place one of the 800K diskettes into a 400K drive, a dialog box pops up to tell you that the diskette is unreadable and asks if you would like to initialize it. If you choose the initialization option by mistake, you will wipe out the contents of the 800K diskette, which could be disastrous if it contained valuable

software or data. As long as you are working only with 400K diskettes, this hazard does not present a problem, but if there's any chance that you'll encounter 800K diskettes, it's a good idea to get your internal drive upgraded to 800K.

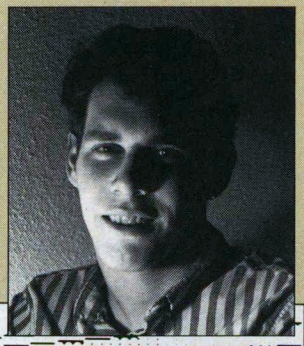
Owners of external 400K drives are faced with an uglier problem. Apple's Mac upgrade plan doesn't address upgrading the 400K external drive. Having a 400K external drive really creates a problem if you have upgraded to an internal 800K drive, since the external 400K drive cannot read 800K diskettes formatted by the internal drive. I think it's inadvisable to have a two-drive computer system in which one drive can't read diskettes created by the other one. If you upgrade your internal drive to

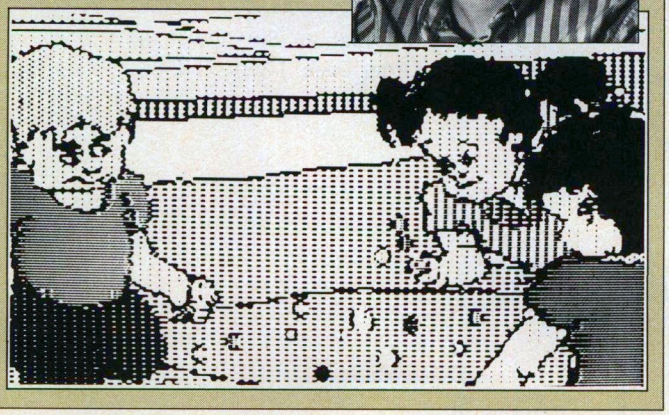
800K and want the convenience of an external drive, therefore, you should definitely get the 800K drive.

It would be nice if you could upgrade the external drive for the same $299 price as that of the internal-drive upgrade. Instead, Apple expects you to buy an 800K half-height external drive for $499. And where does that leave your 400K drive? Good question, and one without a clear answer. I suggest trying to sell your 400K drives for whatever you can get to Mac 512K owners who haven't upgraded yet. Or you can write a protest letter to the Macintosh Product Manager at Apple offering your drive as spare parts and asking the company to provide an upgrade for the external drive.

AND THE WINNER IS . . .

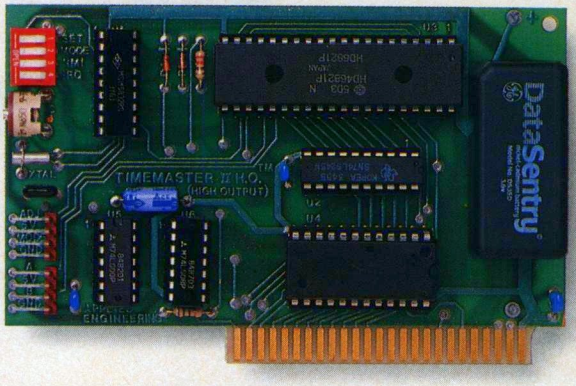
Graphics-software developer Baudville held a contest last year called "You Oughta Be in Pictures" that asked entrants to submit the best animated movie they'd created with Baudville's Take 1 animation program for the Apple II. The winners of this competition were Randy Vose of Shorewood, Illinois, in the age-17-and-under category, for *Jake Cutter II*, an animated adventure story; and Brian White of Houston, Texas, in the age-18-and-over category for *Marbles*, a story of a children's marble game and the travels of a wayward marble. White will soon be graduating from the Art Institute of Houston, and he hopes to move to California to work as a professional animator. Both White and Vose win a $1000 shopping spree for computer products.





BRIAN WHITE AND A SCENE FROM HIS WINNING PROGRAM

Timemaster H.O.™, the only clock that displays time and date on AppleWorks'™ screens and files.



Now, get all the features of all the competition combined!

It's the smart way to put the time and date on your Apple II+® or IIe®. Because only the Timemaster H.O. packs *ALL* the features of all the competition *combined,* including leap year, year (not just in PRO-DOS), month, date, day of week, hours, minutes, seconds and milliseconds. It's totally PRO-DOS, DOS 3.3, PASCAL and CP/M compatible. And of course, it works better than any other clock with AppleWorks.

If you're using or writing software for other clock cards, you're still covered. Because the H.O. will *automatically* emulate them. And the Timemaster H.O. adds 14 new commands to BASIC. The H.O. even comes complete with two disks full of sample programs, including a computerized appointment book, a DOS dating program, interrupt programs, and over 30 programs that others charge extra for — or don't even offer.

As a low-cost option, you can add true BSR remote control to the H.O., giving you remote control of up to 16 lights and appliances in your home or office.

• Fully PRO-DOS and DOS 3.3, CP/M and PASCAL compatible • Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond capability); date with year, month, day of week and leap year • 24-Hour military format or 12-hour AM/PM format • Eight software controlled interrupts so you can run two programs at the same time (many examples included) • Can be set to the second • Allows AppleWorks to time and date stamp all data automatically • The only clock card that displays time and date on the AppleWorks screen • Five-year warranty

Clock price **$129.00**
BSR option (may be added later) ..... **$ 49.00**

Call to order today, 9 a.m. to 11 p.m. seven days, or send check or money order to Applied Engineering. MasterCard, VISA and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

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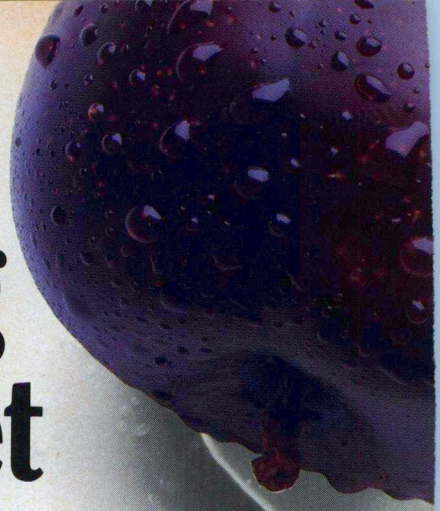
Our word processing plum will get more juice from your Apple®.



WordPerfect word processing for Apple IIe/IIc.

If you have ever felt shortchanged by your IIe or IIc word processing, it's probably not because your Apple is rotten. It's more likely a worm in your software.

WordPerfect word processing software is designed to get the highest possible performance from your Apple. The same functions and features that have made WordPerfect one of the best-selling word processors for PCs, make it the perfect word processor for your Apple.

Clear and simple.

WordPerfect is easy to use. Most functions require just one or two keystrokes. And on-line help screens and a step-by-step manual make learning a breeze.

With WordPerfect, what you see is what you get. On-screen formatting ends the guesswork, so there are no format surprises when you print your document.

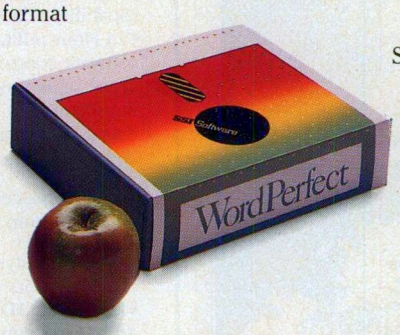
Functional and powerful.

Even the most demanding word processing functions are handled smoothly and thoroughly by WordPerfect. Like footnotes, concurrent printing and editing, macros, redefining of headers and footers, and an optional 50,000-word spelling dictionary. Functions not found on many word processors. Functions which allow WordPerfect to squeeze more juice than ever before out of your Apple.

And affordable.

With all it has to offer, WordPerfect for the Apple IIe and IIc sells for only $179. Add just $30 for the spelling dictionary. It's a small price to pay for perfection.

For a demonstration or more information, see your Apple dealer. Or write or call:



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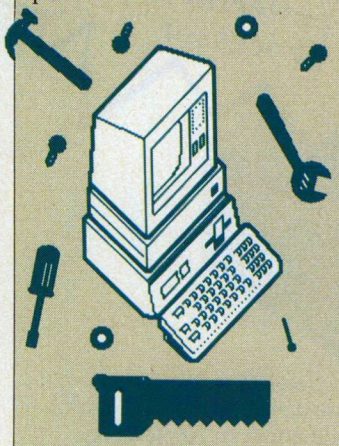
CIRCLE 222 ON READER SERVICE CARD

NewsPlus

Multimedia databases that combine text, graphics, animation, and music?

APPLE III SERVICE

Sun Data of Logan, Utah, has signed an agreement with Apple that gives Sun Data the responsibility of servicing and supporting the approximately 80,000 Apple III computers Apple sold altogether. The agreement permits Sun Data to sell reconditioned Apple III computers, along with software and accessories for the orphaned computers. Sun Data provides telephone technical support and a bulletin-board



system to help Apple III users with questions and problems. Sun Data claims it can troubleshoot most problems over the phone; by talking with users, the company's support staff can determine which component is not working and then mail any needed part(s) with installation instructions. You can contact Sun Data at P.O. Box 4059, Logan, UT 84321; (801) 752-7631.

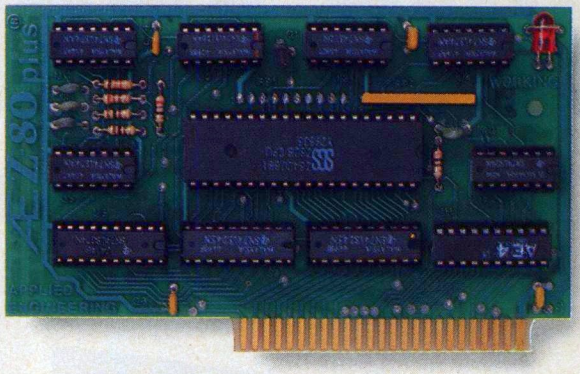
MULTIMEDIA MICROSOFT

Bill Gates, the brilliant young chairman of Microsoft, is saying that his company will develop multimedia databases that

combine text, graphics, animation, and music. At this year's Personal Computer Forum in Phoenix, Arizona, Gates said that these multimedia databases would rely on CD-ROM technology and a device he referred to as an "information viewer" that could be expanded to include devices such as a keyboard and mouse. It struck me that this information viewer was really a television with plug-in slots that could accommodate CPU boards, CD-ROM controllers, and so forth. If so, this development could signal the beginning of a move by the computer industry into the television-set arena.

I have always thought that home computers would really take off if they could be effectively combined with television

With Z-80 Plus,™ run CP/M®-the largest body of software in existence.



Now, get two computers in one, and all the advantages of both.

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering, and introduce your Apple IIe® or II+® to the thousands of CP/M programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system ever for running CP/M programs.

The new 4.0 boasts advanced features like built-in disk emulation for popular memory expansion boards, boosting both system speed and storage capacity. And menu-driven utilities that let you get to work faster. The Z-80 Plus also lets you run older CP/M programs — all the way down to Version 1.6 (2.2 is the most popular).

The Z-80 Plus is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have an extended 80-column card, all 128K is usable, and if you have RamWorks, up to 1088K is available.

Each Z-80 Plus comes with our CP/M Ram Drive software, enabling IIe owners to use an extended 80-column card or a RamWorks card as a high-speed Ram disk which runs CP/M software up to *twenty times faster.* So packages like WordStar and dBASE II run at blinding speed.

Simply plug the Z-80 Plus into any slot in your Apple. You'll get the benefits of two computers in one — all at an unbelievably low price (only $139!).

• Fully compatible with ALL CP/M software • Fully compatible with most hard disks, including Corvus and the Sider • Fully compatible with Microsoft disks (no pre-boot required) • Specifically designed for high speed operation in the Apple IIe (runs just as fast in the Apple II+ and Franklin) • Runs WordStar, dBASE II, Turbo Pascal, Fortran-80, Peachtree and ALL other CP/M software with *no pre-boot* • Semi-custom I.C. and low parts count allows Z-80 Plus to fly through CP/M programs with extremely low power consumption (we use the Z-80B) • Does EVERYTHING other Z-80 boards do, *plus* Z-80 interrupts • Five year warranty

Call to order today, 9 a.m. to 11 p.m. seven days, or send check or money order to Applied Engineering. MasterCard, VISA and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

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MegaWorks with AppleWorks. MegaWorks is the Mail Merge and Spelling correction program designed exclusively for AppleWorks. MegaWorks' mail merge lets you combine information from AppleWorks database files with word processing documents to print personalized form letters. MegaWorks' spelling checker corrects misspelled words in documents and allows you to customize its 40,000-word dictionary with 10,000 more words of your own. Both mail merge and spelling correction maintain word wrapping and pagination of documents.

ReportWorks with AppleWorks. ReportWorks is the powerful report generator that uses your AppleWorks files to print lists, fill out forms, and analyze your data. In fact, ReportWorks allows you to produce just about any kind of report in any kind of format. And ReportWorks can add tax, look up prices, calculate discounts, enter client information automatically, and much, much more. Now, with AppleWorks and ReportWorks you can

• Fill out any form, including purchase orders, invoices and more • Calculate and print estimates and proposals • Analyze and summarize lists and other data

MegaWorks, ReportWorks, AppleWorks—The Complete Works. Both ReportWorks and MegaWorks are designed exclusively to add power to AppleWorks. They both use the same easy-to-use commands as AppleWorks. So if you know how to use AppleWorks, you already know how to use ReportWorks and MegaWorks. Both programs are completely compatible with all your existing AppleWorks files.

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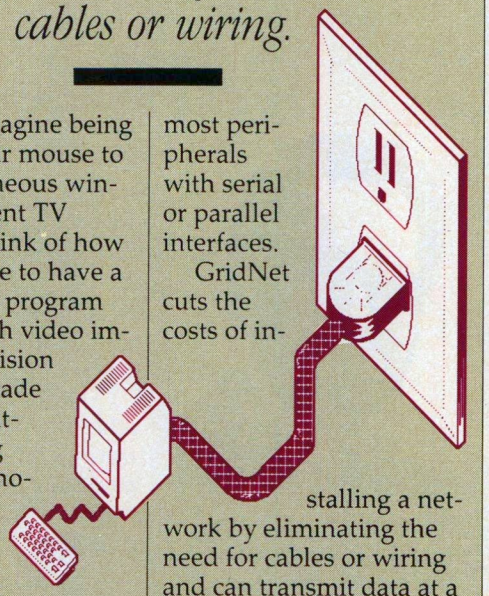
CIRCLE 260 ON READER SERVICE CARD

NewsPlus

A new local-area network eliminates the need for cables or wiring.



technology. Imagine being able to use your mouse to create simultaneous windows of different TV channels, or think of how nice it would be to have a MacPaint-type program for playing with video images. The television industry has made a few meager attempts at using computer technology (anyone remember MSX?), but I think the computer industry can do a lot better job making televisions than the television industry can do making computers. Who knows, perhaps we'll see expandable TV sets someday from the likes of Microsoft, Apple, and IBM.

NETWORK WITHOUT CABLES

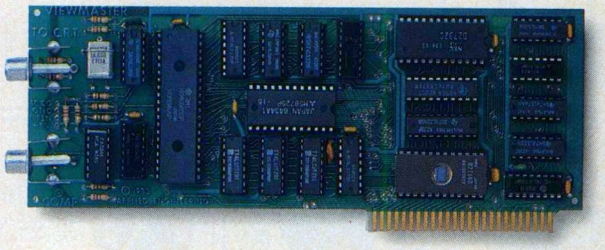
GridComm of Danbury, Connecticut, has announced a new local-area network that connects up to 60 computers and peripherals, using a building's existing electrical wiring to carry data signals. Only eight devices can communicate at a time, though. The new product, called GridNet, connects numerous computers, including the Apple II, Macintosh, IBM PC, and IBM PC AT; computers from Tandy, Compaq, NCR, Hewlett-Packard, and Wang; and most peripherals with serial or parallel interfaces.

GridNet cuts the costs of installing a network by eliminating the need for cables or wiring and can transmit data at a speed as high as 23,000 bits per second over an area of approximately 50,000 square feet. The system also features electronic mail and data encryption to protect against electronic eavesdroppers. For more information, contact GridComm, 20 Old Ridgebury Road, Danbury, CT; (203) 790-9077.

APPLE JOINS CORPORATION FOR OPEN SYSTEMS

In another move to increase the ability of Apples to connect to other computers, Apple has joined the Corporation for Open Systems (COS), a group formed this year to promote communications standards for computers of all types and sizes with all sorts of communications equipment. Apple is the only member of COS that

Viewmaster 80,™ the sharpest 80 column card of them all.



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VIEWMASTER 80	✓	✓	✓	✓	✓	✓	✓	✓	
SUPRTERM		✓					✓	✓	
WIZARD 80					✓		✓	✓	
VISION 80	✓	✓			✓				
OMNIVISION		✓					✓	✓	
VIEWMAX 80	✓	✓			✓			✓	
SMARTERM	✓	✓				✓	✓		
VIDEOTERM		✓	✓		✓	✓		✓	

Now, get great resolution and total software compatibility for your Apple II® or II+®

One look at the chart will give you some of the reasons there's only one smart choice in 80 column cards for your Apple. But the real secret to Viewmaster 80's success is something even better: Total compatibility.

The Viewmaster 80 works with all 80 column applications, including DOS 3.3, PRO-DOS, CP/M, Pascal, WordStar, Format II, Easywriter, Applewriter II, Supertext 80, Zardax, Apple PI, Letter Perfect, dBASE II, Visicalc, Multiplan, and *hundreds* of others.

And the Viewmaster 80 delivers a super sharp, state-of-the-art display with a 7×9 character matrix for clear, easily readable characters. Here are just a few of the powerful features the Viewmaster 80 delivers for a great price ($139):

• 80 Characters by 24 lines • Fully compatible with all Apple languages and software • Super sharp 7×9 character matrix with true descenders • Highest compatibility with existing 80 column software • Power and input connector for light pen • Very low power consumption • High speed (18 MHZ) scroll rate • Upper and lower case characters with true descenders, both inverse and normal; all on-screen editing functions are supported • User-definable cursor shape • Compatible with Apple II, II+ and IIe • Five year warranty

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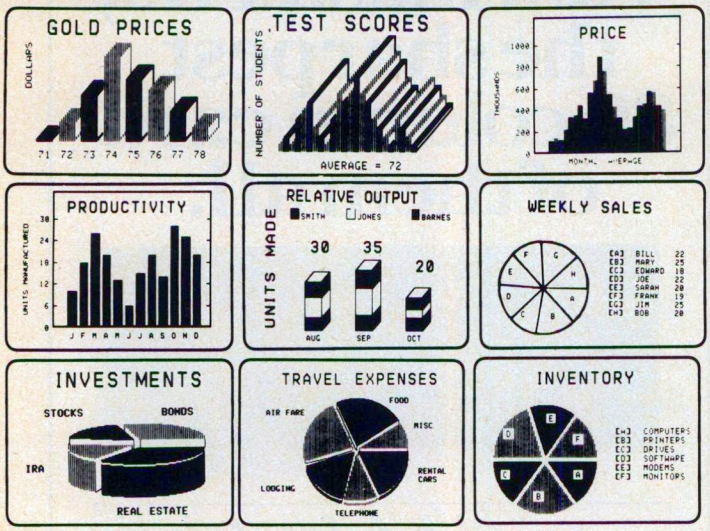
AlphaChart!



CHARTS! Don't pay more for less! The pictures shown above are examples of charts created with **AlphaChart!**, perhaps the most powerful and friendly Apple II chart program on the market. Within seconds, keyboard-entered data can be converted into picture-perfect pie or bar charts, in 26 user-selectable styles, automatically scaled and labelled, and in color or black and white. And **AlphaChart!** prints on most dot matrix printers. If you want to customize your charts by adding extra artwork or text, or display them in a slide show, **AlphaChart!** comes with these valuable extras.....

SLIDE PROJECTOR for orchestrating automated, stand-alone screen presentations of a series of charts, timed and sequenced by the user. This program alone is worth the cost of the disk. It can be used with any graphics files created with any program.

GRAPHICS EDITOR for alteration and embellishment of charts. Besides standard point-by-point sketching, built-in structures permit push-button creation of circles, rectangles, lines, shape-table shapes, and exotic woven plaid patterns. If you wish to add clarifying text to the charts, you may type on the screen in several different letter font styles. For the artist, the graphics editor can also be used to sketch any imaginable scene from scratch.

SHAPE TABLE EDITOR for creating special shapes for your charts. These shapes can also be used for animation in your programs! A sample animation program shows how to do it.

"The software does much more than the advertisement suggests. Without question, this is among the best buys if software that I have ever come across, and certainly among the best written. It is extraordinarily easy to use, very well thought out, and priced to kill your competition (which I wish you every success in doing)." **Anthony J. Scriffignano, North Caldwell, New Jersey.**

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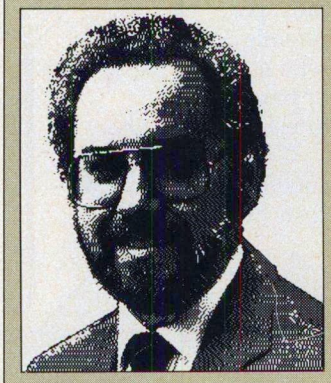
NewsPlus

The MacWorkStation lets you use the Mac with minicomputers and mainframes.



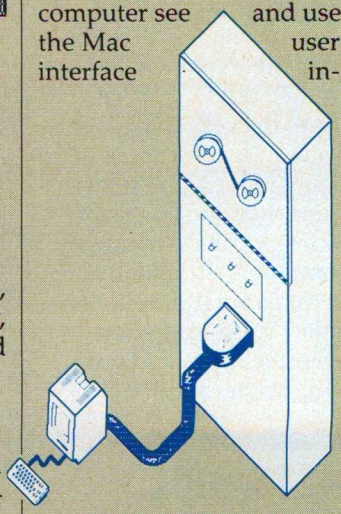
manufactures only personal computers; other COS members include Amdahl, AT&T, Burroughs, Control Data, GTE, Hewlett-Packard, Honeywell, IBM, Intel, NCR, National Semiconductor, Northern Telecom, Pacific Bell, Prime, Sperry, Tandem, Telex, Wang, and Xerox.

According to Apple vice president Del Yocam, "This group's charter is in keeping with our commitment announced last fall to make it possible for Macintosh and Apple II users to easily connect their systems to those of other vendors. We are excited to be involved in this organization."

MACWORKSTATION

One of the main themes that Apple president John Sculley has been sounding this year is that of increased connectivity between the Macintosh and other computer systems. In order to allow the use of the Macintosh with minicomputers and mainframes, Apple has created a development tool called the MacWorkStation that enables software on the larger host computer to operate with the Macintosh's user interface.

The MacWorkStation lets someone using a Macintosh connected to a host computer see and use the Mac user interface instead of the usual command-line interface of the host. This eliminates the need for terminal emulation since the Mac and the host communicate in a background mode. The MacWorkStation Toolbox includes source code and object code for the UNIX System V and VMS operating systems, but you can easily port it to other systems. For more information about the MacWorkStation, contact Apple Computer, Software Licensing Department, M/S 23F, 20525 Mariani Avenue, Cupertino, CA 95014. +



Some More Facts About RAM Cards!

You could put a FLIPSTER or Apple™ 1 meg memory expansion card in slot 4 and add another FLIPSTER or Apple 1 meg memory expansion card in slot 5 (The FLIPSTER and Apple's card only expand to 1 meg). You'll need a separate 80 column card for the auxiliary slot. Oh, and put a printer buffer card in slot 2. If you want RGB color, you'll need an RGB board in slot 7 then buy a hard disk (if you have any slots left).

You'll have a bigger AppleWorks desktop, but you'll still be limited to a maximum of 1350 records in the data base. And you're stuck at 2250 lines in the word processor. And AppleWorks won't automatically load itself into memory, and make sure you don't create a file bigger than your disks can hold because neither FLIPSTER nor Apple's memory card will segment a file onto multiple disks.

Or
You could get RamWorks II!®

You'll have a bigger desktop.

You'll also have up to 15,300 records (not 1350) in the data base and up to 15,300 lines in the word processor (not 2250). AppleWorks will now automatically load into RAM. And if you create a file greater than your disk capacity, no problem. RamWorks II will automatically save it on multiple disks. And because of our built-in printer buffer, you can continue to use AppleWorks while your printer is printing. Nice. RamWorks II has an RGB option, 16 bit option and is expandable to 5 megabytes. And don't forget, RamWorks II is the software industry standard for memory expansion in the IIe. RamWorks II is automatically recognized by virtually all memory intensive programs (and many more are on the way) and is 100% compatible with all IIe software. Clearly the new RamWorks II has more features, more capabilities, and most importantly, is recognized by more commercially prepared programs than any RAM card. RamWorks II is fully compatible with DOS 3.3, ProDos, Pascal 1.1, 1.2, 1.3 and all CP/M versions 2.2 through 4.0. No other memory card enhances software better. And RamWorks II is the acknowledged standard with all serious AppleWorks users.

There's only one card like RamWorks II. If someone tempts you with an imitation, please call us to get both sides of the story. You'll discover why RamWorks II offers the best enhancements to AppleWorks and a long list of other programs.

	RamWorks II®	FLIPSTER/ Apple's Card
Maximum Desktop	2277K	1012K
Maximum Number of Records in Database	15,300	1350
Maximum Number of Lines in Word Processor	15,300	2250
Autoloads AppleWorks	YES	NO
Auto Segments Files	YES	NO
Built-in Printer Buffer	YES	NO
Compatible With All Versions of AppleWorks	YES	NO
Displays Time & Date on AppleWorks Screen with Clock	YES	NO
Saves Slots	YES	NO
RGB Option	YES	NO
16 Bit Co-Processor Port	YES	NO
Memory Expansion Ports	YES	NO
Patent Pending Power-Saving Circuit	YES	NO
80 Columns Built-in	YES	NO
Maximum Memory per Slot	5120K	1024K
Compatible with Franklin 2000 Software	YES	NO
Compatible with Auxiliary Slot	YES	NO
Software Standard	YES	YES
Manufactured in	USA	England/ Singapore
Warranty	5 Yrs.	1 Yr./ 90 Days
Price	LESS	MORE

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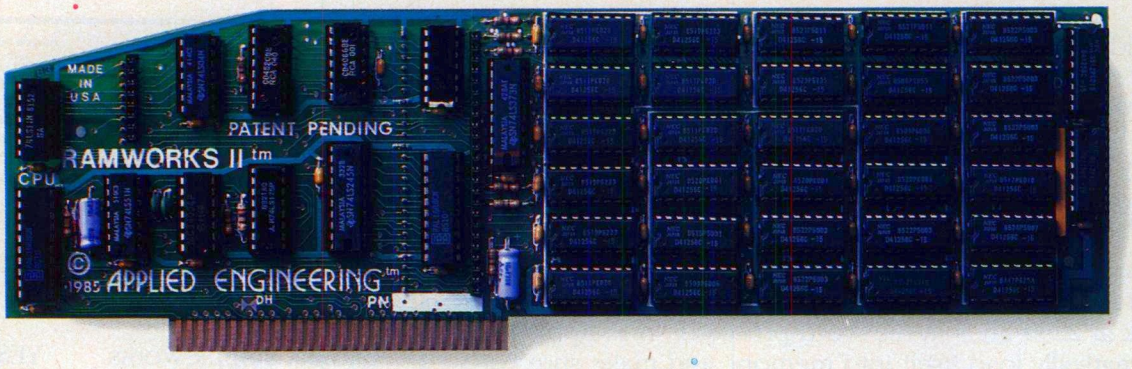


64K to 16 MEG! RamWorks II Is Number One.

It's simple, RamWorks II sells the most because it does the most.

The AppleWorks Amplifier.

While RamWorks II is recognized by all memory intensive programs, NO other expansion card comes close to offering the multitude of enhancements to AppleWorks that RamWorks II does. Naturally, you'd expect RamWorks II to expand the available desktop, after all Applied Engineering was a year ahead of everyone else *including Apple* in offering more than 55K in AppleWorks and we still provide the largest AppleWorks desktops available. But a larger desktop is just part of the story. Just look at all the AppleWorks enhancements that even Apple's own card does not provide and *only* RamWorks II does. With a 256K or larger RamWorks II, all of AppleWorks will automatically load itself into RAM dramatically increasing speed by eliminating all the time required to access the program disk drive. Now switch from word processing to spreadsheet to database at the speed of light with no wear on disk drives.

Only RamWorks II eliminates AppleWorks' internal memory limits, increasing the maximum number of records available from 1,350 to over 15,000. *Only* RamWorks II increases the number of lines permitted in the word processing mode from 2,250 to over 15,000. And *only* RamWorks II (256K or larger) offers a built-in printer buffer, so you won't have to wait for your printer to stop before returning to AppleWorks. RamWorks II even expands the clipboard. And auto segments large files so they can be saved on two or more disks.

RamWorks II, nothing comes close to enhancing AppleWorks so much.

The Most Friendly, Most Compatible Card Available.

Using RamWorks II couldn't be easier because it's compatible with more off-the-shelf software than any other RAM card. Popular programs like AppleWorks, Pinpoint, Catalyst, MouseDesk, Howard-Soft, FlashCalc, The Spread Sheet, Managing Your Money, SuperCalc 3a, and MagiCalc to name a few (and *all* hardware add on's like ProFile and Sider hard disks). RamWorks II is even compatible with software written for Apple cards. But unlike other cards, RamWorks II plugs into the IIe auxiliary slot providing our super sharp 80 column text in a completely integrated system while leaving expansion slots 1 through 7 available for other peripheral cards.

Highest Memory Expansion.

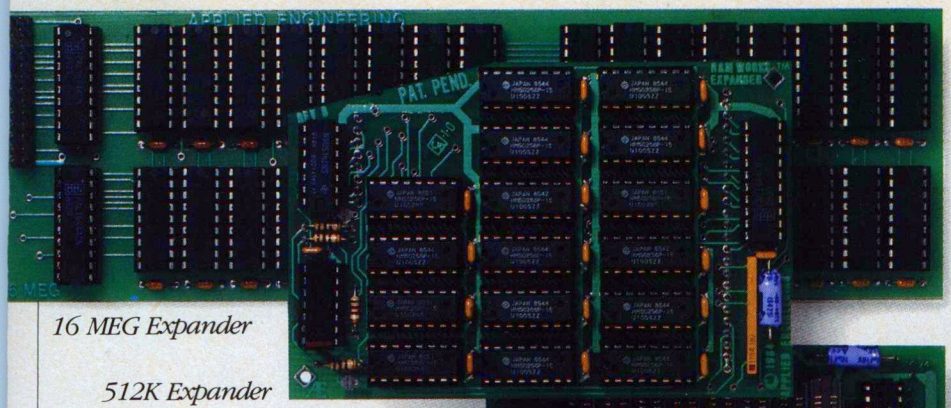
Applied Engineering has always offered the largest memory for the IIe and RamWorks II continues that tradition by expanding to 1 full MEG on the main card using standard RAMs, more than most will ever need (1 meg is about 500 pages of text)...but if you do ever need more, RamWorks II has the widest selection of expander cards available. Additional 512K, 2 MEG, or multiple 16 MEG cards just snap directly onto RamWorks II by plugging into the industry's only low profile (no slot 1 interference) fully decoded memory expansion connector. You can also choose non-volatile, power independent expanders allowing permanent storage for over 20 years.

It Even Corrects Mistakes.

If you've got some other RAM card that's not being recognized by your programs, and you want RamWorks II, you're in luck. Because all you have to do is plug the memory chips from your current card into the expansion sockets on RamWorks II to recapture most of your investment!

The Ultimate in RGB Color.

RGB color is an option on RamWorks II and with good reason. Some others combine RGB output with their memory cards, but that's unfair for those who don't need RGB *and* for those that do. Because if you don't need RGB Applied Engineering doesn't make you buy it, but if you want RGB output you're in for a nice surprise because the RamWorks II RGB option offers better color graphics plus a more readable 80 column text (that blows away any composite color monitor). For only $129 it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that most claim is the best they have ever seen. You'll also appreciate the multiple text colors (others only have green) that come standard. But the RamWorks II RGB option is more than just the ultimate in color output because unlike others, it's fully



16 MEG Expander

512K Expander

compatible with all the Apple standards for RGB output control, making it more compatible with off-the-shelf software. With its FCC certified design, you can use almost any RGB monitor because only the new RamWorks II RGB option provides both Apple standard and IBM standard RGB outputs (cables included). The RGB option plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and remember you can order the RGB option with your RamWorks II or add it on at a later date.

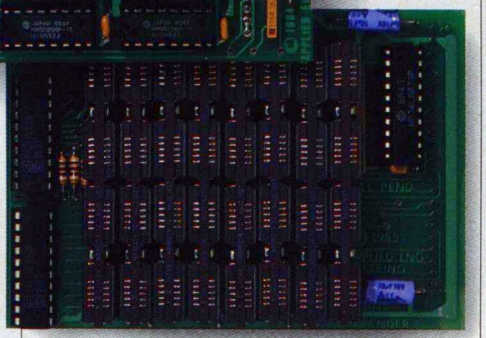
True 65C816 16 Bit Power.

RamWorks II has a built-in 65C816 CPU port for direct connection to our optional 65C816 card. The only one capable of linearly addressing more than 1 meg of memory for power applications like running the Lotus 1-2-3™ compatible program, VIP Professional. Our 65C816 card does not use another slot but replaces the 65C02 yet maintains full 8 bit compatibility.

Endorsed by the Experts.

Steve Wozniak, creator of the Apple Computer said "I wanted a memory card for my Apple that was fast, easy to use, and very compatible; so I bought RamWorks." A+ magazine said "Applied Engineering's RamWorks is a boon to those who must use large files with AppleWorks...I like the product so much that I am buying one for my own system." inCider magazine said "RamWorks II is the most powerful auxiliary slot memory card available for your IIe, and I rate it four stars...For my money, Applied Engineering's RamWorks II is king of the hill."

Apple experts everywhere are impressed by RamWorks II's expandability, versatility, ease of use, and the sheer power and speed that it adds to any IIe. With a RamWorks II in your Apple, you'll make IBM PC's and AT's look like slowpokes.



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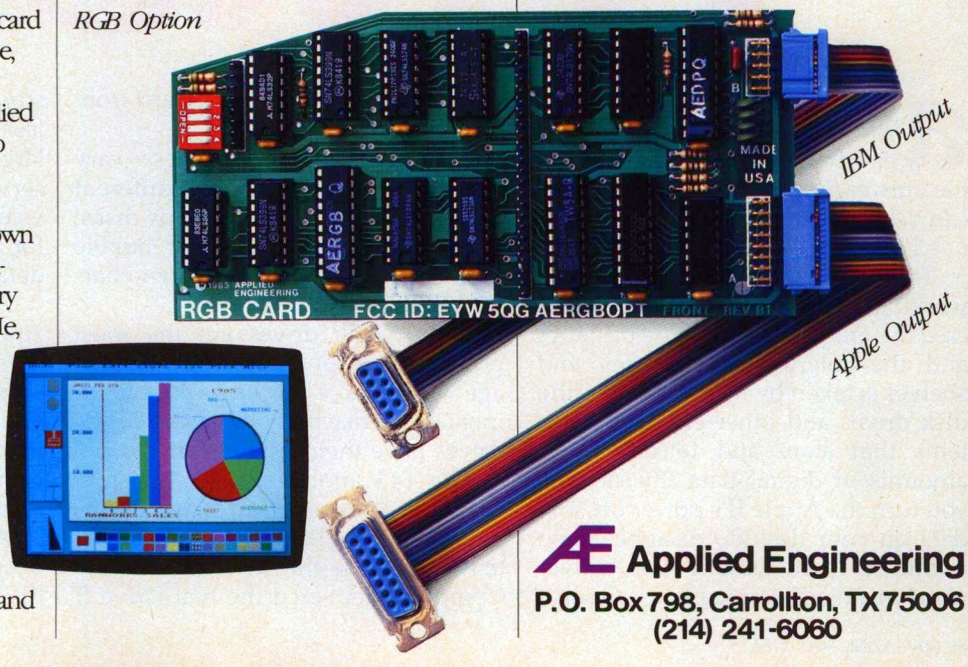
RGB Option



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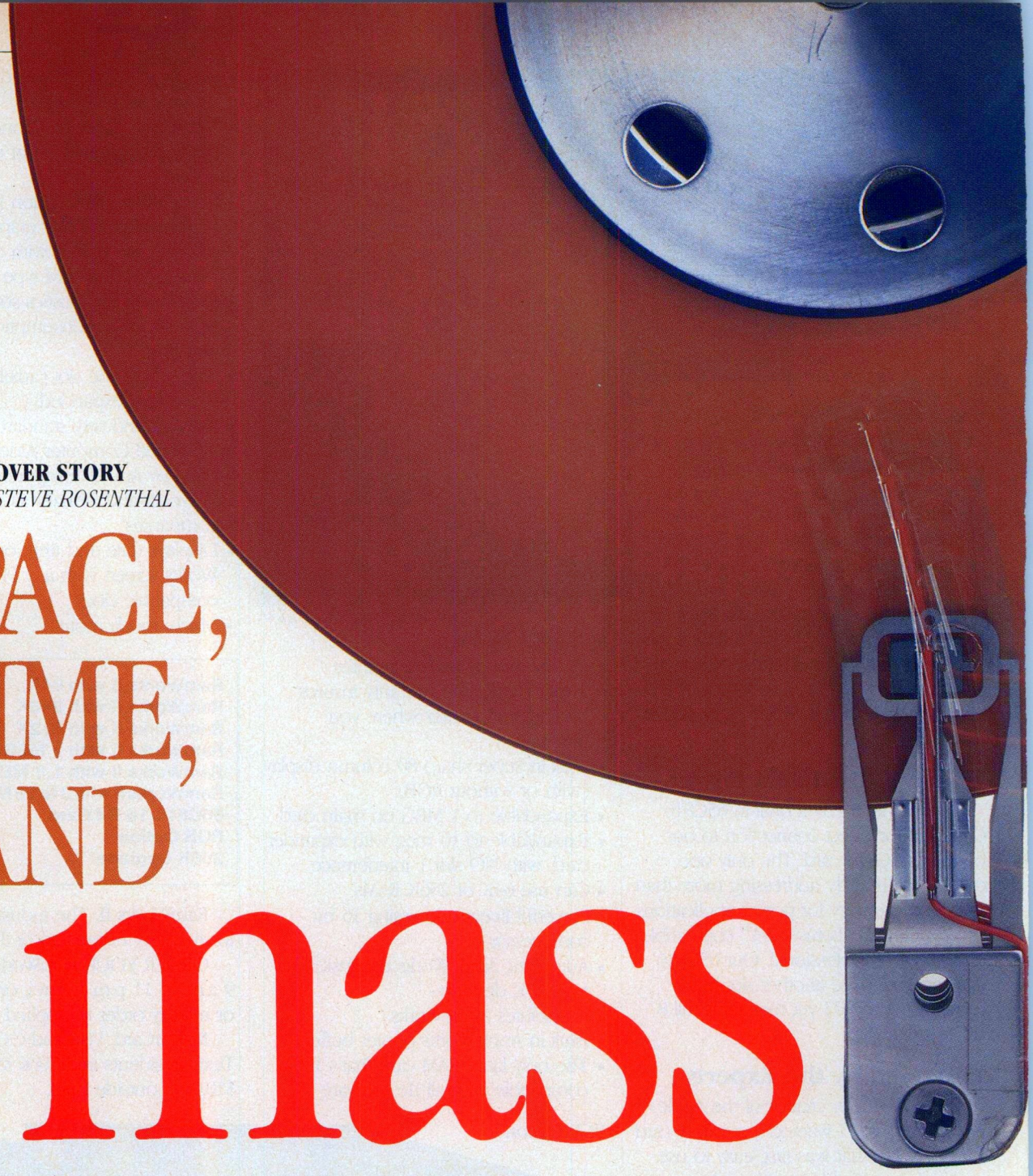


COVER STORY
BY STEVE ROSENTHAL

SPACE, TIME, AND mass

anyone who does much paperwork quickly discovers how handy it is to have a shelf and file drawer right at your desk. You just can't keep all the documents you need out on your desktop all the time.

The same principle applies to working with an Apple II, but in this case the main memory is the desktop, and the role of the drawers and shelves is taken by mass storage—the disk drives and other electronic systems that store and retrieve large amounts of digital data. Every time you turn the Apple II's power off, any data on your desktop disappears, so finding a more durable and convenient means of storage is essential if you want to carry work forward from one session to the next.

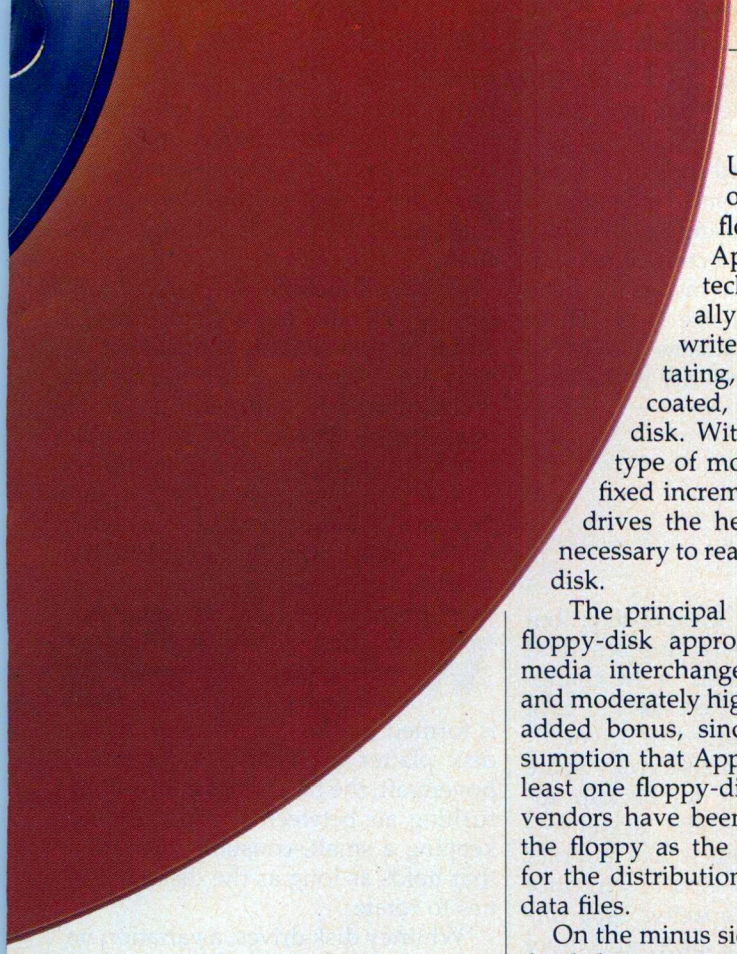
Data-storage technologies vary even more widely than do different types of office furniture. Floppy disks, hard disks, RAMdisks, and bubble memories each have their own characteristics and advantages.

Floppy-disk drives are the most popular form of Apple II mass storage, with one or more attached to almost every machine. But even floppy drives have their differences.

The 143 kilobytes (143 thousand characters) of storage an ordinary Apple II disk provided looked like a lot in 1978 when the then tiny Apple Computer delivered the first Drive II storage systems. Most programs were less than 16K long, and few users had large data files. Floppy-disk drives served admirably as mass-storage devices, and many of us were thankful for a chance to upgrade from storing data on audiotape.

As the Apple II evolved into the Apple II Plus, IIe, and IIc, 143K began to seem smaller and smaller. With bigger programs, more main memory, and bigger data files, it's been getting harder and harder to stuff everything from the desktop away on a reasonable number of floppy diskettes.

Apple's response, of course, has been the UniDisk, the 800K 3½-inch disk drive with the hard-shelled disk,



storage

gins to seem small.

The Disk II, the UniDisk, and the other high-capacity floppy drives for the Apple II all use a technology that actually presses a read/write head against a rotating, magnetically coated, flexible, plastic disk. With most designs, a type of motor that rotates in fixed increments (a "stepper") drives the head in and out as necessary to reach each part of the disk.

The principal advantages of the floppy-disk approach include good media interchangeability, low cost, and moderately high reliability. As an added bonus, since it's a good assumption that Apple II users have at least one floppy-disk drive, software vendors have been able to focus on the floppy as the principal medium for the distribution of programs and data files.

On the minus side, if the head and the disk stay engaged, they wear each other out, with a disk typically good for a matter of hours of actual transferring time—a head can last several hundred hours. Floppy diskettes, especially the 5¼-inch style without a hard shell, are susceptible to handling damage. Also, although floppy drives are many times faster than the older types of tape storage, using them is a relatively slow method of getting large amounts of information into and out of an Apple II.

similar to the drives and disk of in the Macintosh. Other firms, notably the now-defunct Rana Systems, have also brought higher-capacity floppy drives for the Apple II to market.

You have to work fairly hard to create more than 800K of useful data in a single session, so the UniDisk or other large-capacity floppy drive serves well as mass storage for people who mainly engage in repeated sessions with a single simple application program. If, on the other hand, you like to have the ability to pull up any one of half a dozen programs, or one of your programs includes massive amounts of code and Help files, even 800K be-

A Win-Win Solution

The next step up from floppy-disk drives for most Apple II owners is to a 10- or 20-megabyte Winchester hard-disk drive. More than a dozen brands come in Apple II models (see the Hard Disk Chart following this article), and they're widely available both by mail and in local stores.

A Winchester disk drive (so named because of its similarity to an IBM-produced disk drive with that code name) stores much more data than a floppy drive, finds it much faster, and shifts it in and out at a much higher rate of speed.

In general, hard-disk drives can provide higher data capacities than floppy drives. Using a rigid medium allows writing the tiny magnetic data tracks much closer together without loss of alignment, and many hard-disk models pack more than one platter into each drive, supplying a proportional increase in the surface area on which to store information.

Floppy diskettes, for all their apparent consistency, actually stretch and shrink slightly with temperature and humidity. That variation and a concomitant need to leave extra space between tracks account for the paradox that as floppy diskettes get bigger, their maximum capacity may instead get smaller. Because smaller diskettes expand and contract less, they can be treated more like rigid media.

Winchester disks also rotate much faster than floppy diskettes do—typically ten times as fast. The faster rotation means that each piece of information or recording location comes around more quickly on a hard disk than it does on a floppy diskette, which proportionately reduces the "rotational latency," the average time the computer has to wait to read from and write to any particular location.

When the data location does reach the read/write head, the data-transfer rate is also faster, which can be a noticeable advantage, especially if you're transferring long data files or programs. A program that takes ten seconds to load from a floppy diskette might take only a second from a

CARTER DOW PHOTOGRAPHY

hard disk, and the ratio goes even higher if the drive has to collect the data from disparate locations all over the disk. In general, hard-disk-drive positioning mechanisms are more nimble than the head positioners on floppy-disk drives. Floppy drives take longer to step the head in and out from track to track (they require a longer "track-to-track access time") and more "settle time," for the mechanism to come to a complete stop when it reaches the right track position.

In fact, some hard-disk drives' positioning mechanisms achieve a speed increase by using an electronically controlled electromagnet instead of a motor that moves the head in and out in fixed-size steps. These "voice coil" mechanisms (so called because of their similarity to the electromagnetic mechanisms that drive most audio speakers) are slightly more costly than the usual type, but they can cut the time the read/write head needs to race from the edge of the disk to the middle in more than half.

To get all this speed, though, hard-disk drives have had to make certain compromises. To use a high rotation rate, for example, hard-disk drives must skim their magnetic heads as close to the disk surface as possible but keep them out of direct contact with it. If a head were to hit the surface of a disk moving at that speed, it might gouge the disk or bend the head supports—the disaster that most people refer to as a head crash.

Winchester disk drives avoid this danger by floating the head on a cushion of air that is formed by the very rotation of the disk platter itself. Like a miniature hovercraft, the head traps some of the rushing air between it and the disk, keeping a small, constant separation that holds as long as the disk continues to rotate.

Whitney disk drives, a variation on the basic Winchester methodology, use a smaller, stiffer head and float it even closer to the surface.

One side effect of this technology is that the disk drive needs much cleaner air than it's likely to encounter in the average home or business. The gap between the disk and the head is so small that common dust particles, cigarette smoke, stray hair, and even fingerprints loom up as insurmountable obstacles. So Winchester disk drives for Apples and other computers have their crucial mechanisms encased in a sealed chamber, to which air is admitted only after it has been cleaned and filtered.

Another, more recent, defense against internal hard-disk accident is using a harder disk surface than before, and less angular heads. Instead of the relatively soft oxide-based coatings of floppy diskettes and the original hard-disk platters, some newer hard-disk platters (called plated media, after the principal means of producing the surface) for the Apple II use harder metal-alloy surfaces. You'll find these especially in drives intended to withstand the rigors of portable use. They do, unfortunately, still need to work in a suitable filtered atmosphere.

The biggest disadvantage of any of these standard hard-disk drives,

safety IN MANY FORMATS

Everyone who works with Apple II hard-disk drives eventually agrees that making backup copies of crucial data and programs is a necessity, but drive vendors recommend a variety of different methods and equipment to do the job.

The best backup for a hard-disk drive, say a few vendors, is a second, identical drive. The advantage is simplicity of design and operation, and it's unlikely that both drives will fail at the same time. Backing up one hard disk on another is also a fast process.

Other vendors point out, however, that a software bug or operational error can cause the computer to erase either or both drives before anyone realizes the problems, which makes relying on any on-line device for safety storage too dangerous.

Most vendors and users therefore argue that effective backup requires removable media that you can separate from the computer. In fact, many say, you should store a copy of any crucial information not only off-line from the computer but also at a different physical location.

Removable hard disks certainly qualify in terms of the separability of data and computer, and their ability to serve as backup devices while providing high-speed mass storage is one element of their popularity. They are, unfortunately, generally more expensive and more limited in capacity than are several other backup alternatives.

High-density floppy-drive systems should prove an effective and popular backup method, once more widespread distribution brings lower costs and greater availability of the disks. Vendors say high-density floppies will be relatively inexpensive, but multiple high-density floppies (and some human attention to the changing of disks) will be necessary to back up high-capacity hard-disk drives.

Two tape formats also enjoy some degree of popularity for backup applications. Tape-cassette systems—which use tapes much like popular audiotape cassettes—are low in price and moderate in capacity. Tape-cartridge systems use a larger and more complex shell to hold the tape but store much larger capacities (up to tens of megabytes) per cartridge.

Tape systems for backup generally operate in a continuous, "streaming" mode, reading and writing data too quickly to stop and start between blocks of data without overshooting the blocks' boundaries. Many can still back up and read back data on a file-by-file basis, however, as well as recording and playing back data by physical disk track and sector in a complete disk-image mode, in which they record an exact duplicate of the disk.

A few more-exotic systems have used videotape for backup, which results in large capacity per tape and relatively fast operation. This approach may grow sharply in popularity if a standard, small-size videotape format, such as the new 8mm size, takes hold.

The least-expensive backup system in terms of initial outlay is almost always the Apple II's own floppy-disk drive, supplemented by the appropriate file-transfer software. Few users, though, are willing to actually copy the contents of a 20-megabyte drive onto 140 floppy disks even once, much less as frequently as prudent business practice demands.

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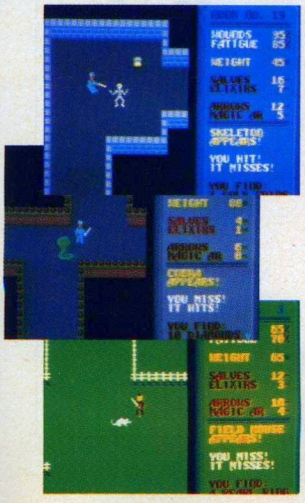

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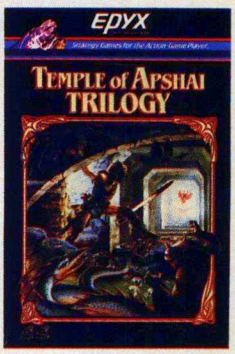

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though, is that the media are not removable or interchangeable. If you fill up your 10 or 20 megabytes, that's it—you have to clean out files, download to floppies, or invest in some kind of high-capacity tape-based backup storage.

finding a way to duplicate your hard-disk files is also a necessary form of insurance. If anything goes wrong with your hardware or software or your machine's operation, a hard-disk drive can wipe out any file in a fraction of a second. Even if you're foolish enough to drive without seatbelts, you don't want to run a hard-disk drive without a backup system.

Winchester drives are generally more expensive than floppy-disk drives, but few users who can afford a hard-disk drive ever want to go back to a floppy drive. Depending on storage capacity, speed, packaging, and support, Winchesters normally sell for $500 to $4500 a unit.

A Close Cousin, Once Removed

One solution to both the capacity and backup problems of standard-technology hard-disk drives is the *removable* cartridge hard-disk drive. This kind of drive uses a cartridge that looks somewhat like a larger version of the hard-shelled 3½-inch floppy disk, but it instead contains a single hard-disk platter.

Even if you are foolish enough to drive without seatbelts, you don't want to run a hard-disk drive without a backup system.

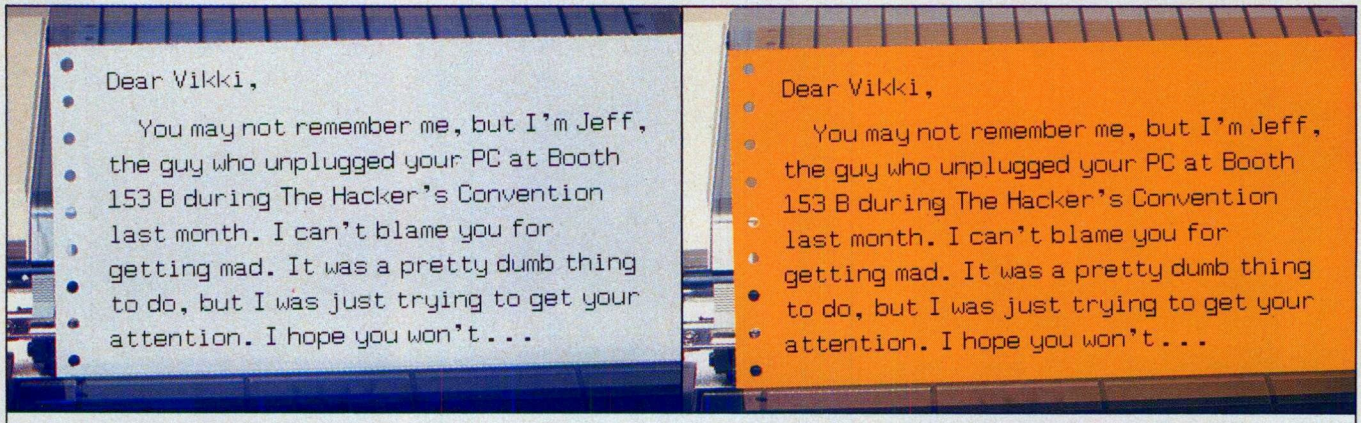
As far as the Apple II is concerned, most removable disks are just like a fixed-platter hard disk of equivalent capacity. They use the same interfaces and have the same transfer speeds and often similar rates of head movement. The only difference is that when you fill up a cartridge or want to store data away for safekeeping, you pop open a door, pull out the cartridge, and put another in.

Rather than depending on a sealed air chamber, removable-hard-disk drives must instead keep dirt and dust out during operation. They do this by supplying the disk chamber with a steady supply of highly filtered air, which blows any contaminated air out of the way. When you insert a different cartridge into the drive, the system goes through a "purge" cycle and replaces all the air, a process that generally takes less than a minute.

Another variation on this same idea uses not a rigid disk and a flying head, but a fast-spinning cartridge-encased floppy disk that flies over the read/write head on a moving cushion of air. Such a "Bernoulli box" operates much like a hard disk does, but its interface is just different enough to require a special disk controller and software.

Unfortunately, if you consider just how much capacity is directly on-line at a time, removable hard-disk drives are substantially more expensive than fixed-disk drives of similar capacity. Also, dealing with the inevitable small differences among cartridges requires beefed-up control systems, high-quality processing, and extra manufacturing precision.

If you look at a removable-cartridge drive in terms of total useful ca-



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pacity per dollar, however, its cost-effectiveness looks much better. Since a cartridge's incremental cost is around $20 per megabyte or less, you can get fast access and protection for large amounts of data at a reasonable cost.

If you're willing to compromise a bit on speed and accept the finite wear life of a cartridge, you'll soon be able to choose another crossbreed between floppy drives and hard-disk drives. A new breed of super-high-density floppy-disk drives promises to offer performance close to that of a hard-disk drive, at a cost closer to that of a floppy drive. As with floppy-drive technology, these drives use a head that actually touches the disk surface. So far, no Apple-specific models have been introduced, but we should see some later in the year.

No Moving Parts

Another approach altogether to mass storage is to eschew any moving parts at all. Although disk memories are fairly reliable, they do wear out and break down. Floppy drives and removable-cartridge devices get out of alignment and lose the ability to read data written by what is supposed to be an identical or compatible drive (early removables in particular had a problem with disk interchange). Fast as they are, even the fastest disk drives take many milliseconds for each operation.

Memories No Longer So Precious

Now that ordinary memory chips have dropped so far in cost and gained so much capacity since the original design of the Apple II, adding large amounts of extra memory is certainly one viable solution to an overly cramped electronic desktop. Most large-capacity RAM-board add-ons allow you to partition off some of the memory to use as a simulated electronic disk drive.

These RAMdisks are fast, typically taking microseconds for each operation rather than seconds or milliseconds. Unless you equip them with a separate power supply, however, they don't retain any data when you turn your Apple II off, and you can't pull out the chips to save important data off-line.

Apple makes its own internal add-on memory boards for the Apple II series, as do several other vendors. Prices typically range from less than $200 for 256K to $500 and higher for a megabyte or more.

When reliability of data storage is paramount, magnetic bubble memories offer most of the advantages of RAMdisk technology but also keep safe whatever data they have stored if the power goes out. These solid-state chips use circulating internal patterns of tiny magnetic bubbles to record information, and the bubbles remain stable even without power.

In Apple II-series computers, bubble memories find most favor in industrial and control applications, where their low maintenance requirements, data reliability, and imperviousness to dust bring them to the forefont. Typically, a 128K bubble-memory board costs less than $500.

Software Support

The utility of any of these mass-storage devices depends not only on their basic technology and quality, but also on how well they've been engineered to work with your Apple. Ideally, each should work so smoothly and invisibly that you needn't pay it any special attention.

With Apple II computers, that goal is complicated by the evolution of the

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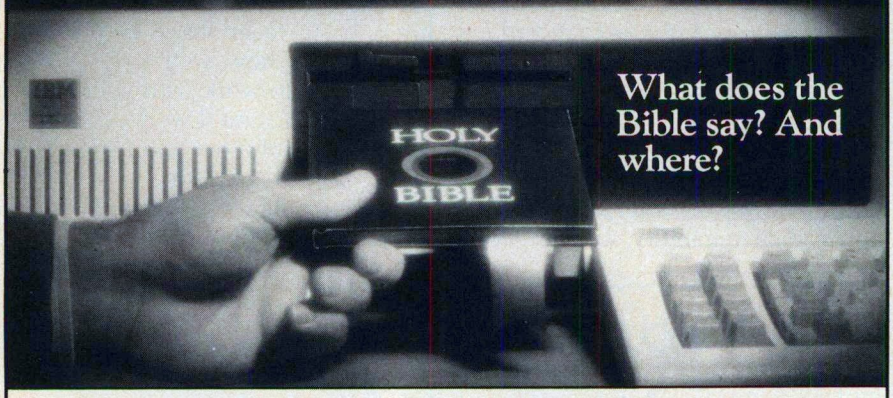

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CIRCLE 130 ON READER SERVICE CARD

No business should risk keeping large volumes of information that are not archived.

product, which has brought us four popular operating systems (DOS 3.3, ProDOS, Pascal, and CP/M), each with its own requirements and ways of communicating with added devices. If you use multiple operating systems, you'll want a disk drive or mass-memory board to work with each and to switch smoothly from one to the other without unnecessary reformatting or reconfiguration.

Most of the mass-memory devices you'll find for the Apple will at least work with DOS 3.3 and ProDOS, although a few make you choose between them. A growing proportion work with all four systems, and a few can even work with an Apple II and a Macintosh or MS-DOS machine if you add an extra interface adapter or two.

Furthermore, many mass-memory devices also include backup software to help you make archival copies of crucial information. Especially for business use, these utilities are more a necessity than a luxury—if you don't have one, you just won't want to do tedious backup chores. No business should risk keeping large volumes of information that are not archived. Good backup software that helps automate the archive process is more valuable than a statistical claim of outstanding hardware reliability. Mass-storage failures are infrequent, but the possible disruptive effects of catastrophic data loss are too easily avoided to ignore.

For most users, though, the balance is clear. Calculating the gains and losses, some kind of mass storage for the Apple II is almost always worthwhile. The right type of storage varies with your application, the setting, and your budget. Keeping your desktop clear while making your programs and data more available can't help but give you the edge in productivity, efficiency, and pleasure in the operation of your Apple II. +

Steve Rosenthal writes regularly for A+ from his cluttered but productive electronic desktop.

hard-disk drives FOR THE APPLE II

fixed hard disk

		OPERATING SYSTEM						BACKUP			DISK	
		ProDOS	DOS 3.3	Pascal	CP/M	OTHER		FIXED HD	TAPE	REMOVABLE HD CARTRIDGE	CAPACITY IN MB	FORMATTED	PLATTER SIZE
10MB ProFile Apple Computer, Inc. 20525 Mariani Drive Cupertino, CA 95014 (408) 996-1010	**Price:** 10MB, $1299 **Manufacturer:** Not available **Warranty:** 90 days standard	■	■	■								■	5¼"
MicroStor AST Research, Inc. 2121 Alton Avenue Irvine, CA 92714 (714) 476-3866	**Price:** 10MB drive & 10MB tape, $1995; 10MB drive only, $1295; 10MB tape only, $1295; 20MB drive & 20 MB tape, $2595; 20MB drive only, $1595; 20MB tape only, $1595 **Manufacturer:** Rodime PLC **Warranty:** 6 months	■	■	■	■			■			10 & 20	■	3.5"
A2e-350-10-NovoComp **A2e-350-20-NovoComp** CMC Computer Systems 1514 E. Edinger, Suite H Santa Ana, CA 92705 (714) 835-2462	**Price:** 10MB, $845; 20MB, $1045 **Manufacturer:** 10MB, Rodime PLC; 20MB, LaPine Technology **Warranty:** 90 days; 12-month extension, $50 **Comments:** Includes internal fan.	■	■	■	■							■	3.5"
A2e-350-10-ProDOS **A2e-350-20-ProDOS** CMC Computer Systems 1514 E. Edinger, Suite H Santa Ana, CA 92705 (714) 835-2462	**Price:** 10MB, $695; 20MB, $895 **Manufacturer:** 10MB, Rodime PLC; 20MB, LaPine Technology **Warranty:** 90 days; 12-month extension, $50 **Comments:** Includes internal fan.	■										■	3.5"
A2i-350-10-NovoComp **A2i-350-20-NovoComp** (internal drive) CMC Computer Systems 1514 E. Edinger, Suite H Santa Ana, CA 92705 (714) 835-2462	**Price:** 10MB, $1045; 20MB, $1245 **Manufacturer:** 10MB, Rodime PLC; 20MB, LaPine Technology **Warranty:** 90 days; 12-month extension, $50 **Comments:** Includes: 75-watt power supply that replaces Apple's; internal fan. All systems complete. Includes software, cables, host cards, controller cards, etc.	■	■	■	■							■	3.5"
A2i-350-10-ProDOS **A2i-350-20-ProDOS** (internal drive) CMC Computer Systems 1514 E. Edinger, Suite H Santa Ana, CA 92705 (714) 835-2462	**Price:** 10MB, $895; 20MB, $1095 **Manufacturer:** 10MB, Rodime PLC; 20MB, LaPine Technology **Warranty:** 90 days; 12-month extension, $50 **Comments:** Includes: 75-watt power supply that replaces Apple's; internal fan. All systems complete. Includes software, cables, host cards, controller cards, etc.	■										■	3.5"
A2i-525-10-NovoComp **A2i-525-16-NovoComp** **A2i-525-20-NovoComp** CMC Computer Systems 1514 E. Edinger, Suite H Santa Ana, CA 92705 (714) 835-2462	**Price:** 10MB, $645; 16MB, $745; 20MB, $845; 10MB/10MB, $1145; 20MB/20MB, $1345 **Manufacturer:** 10MB, Shugart Corp.; 16MB, Rodime PLC; 20MB, Ampex Corp.; 10MB/10MB, Shugart Corp.; 20MB/20MB, Seagate Technology **Warranty:** 90 days; 12-month extension, $50 **Comments:** A21-525-10/10 and A2i-525-20/20—one 10/20 intended for backup.	■	■	■	■			■			10 & 20	■	5¼"
A2i-525-10-ProDOS **A2i-525-16-ProDOS** **A2i-525-20-ProDOS** CMC Computer Systems 1514 E. Edinger, Suite H Santa Ana, CA 92705 (714) 835-2462	**Price:** 10MB, $495; 16MB, $595; 20MB, $695; 10MB/10MB, $995; 20MB/20MB, $1095 **Manufacturer:** 10MB, Shugart Corp.; 16MB, Rodime PLC; 20MB, Ampex Corp.; 10MB/10MB, Shugart Corp.; 20MB/20MB, Seagate Technology **Warranty:** 90 days; 12-month extension, $50 **Comments:** A2i-525-10/10 and A2i-525-20/20—one 10/20 intended for backup.	■						■			10 & 20	■	5¼"
Excelsior Computer Products International 740 S. Hillview Drive Milpitas, CA 95035 (408) 945-0100	**Price:** 12MB, $1795; 24MB, $2495; 60 MB, $3695; 90MB, $4695; 120MB, $6295; 180MB, $6795; 270MB, $8995; 369MB, $10,995 **Manufacturer:** Fujitsu America, Inc.—small fixed drives; Maxtor Corp.—large fixed disks; Micro Storage Corp. and Syquest Technology—backup **Warranty:** 1 year		■			Mac			■	12MB per cartridge	■	5¼"
OmniDrive Corvus Systems, Inc. 2100 Corvus Drive San Jose, CA 95124 (408) 559-7000	**Price:** 11MB, $1695; 21MB, $2795; 45MB, $4995; 126MB, $8995 **Manufacturer:** Rodime PLC, Maxtor Corp. **Warranty:** 6 months **Comments:** Hard-disk stand alone; built-in networking; for IIe; requires transporter card, $495, Constellation II software, $150; can use multiple operating systems.	■	■	■	■								5¼"
WDAP Digital Electronic Systems 302 South Main Street Estill Springs, TN 37330 (615) 649-5137	**Price:** 10MB, $1470; 30MB, $2410; 52MB, $4990; 82MB, $5820; 112MB, $8310; add'l backup: 5MB, $1795; 10MB, $2295 **Manufacturer:** 10MB, Tandon Corp.; 30MB, Syquest Technology; 52MB-82MB, Maxtor Corp. **Warranty:** 6 months **Comments:** Works under CP/M 2.20 or 2.23.	■	■	■	■	MS-DOS			■		5 & 10	■	5¼"

fixed hard disk

		OPERATING SYSTEM					BACKUP			DISK	
		ProDOS	DOS 3.3	Pascal	CP/M	OTHER	FIXED HD	TAPE	REMOVABLE HD CARTRIDGE	FORMATTED CAPACITY IN MB	PLATTER SIZE
Models 5012, 5014, 5019, 5020, 5026 Disc Tech One, Inc. 849 Ward Drive Santa Barbara, CA 93111 (805) 964-3535	**Price:** 5012 (10MB half height), $275; 5014 (10MB), $400; 5019 (15MB), $450; 5020 (20MB), $500; 5026 (20MB half height), $400 **Manufacturer:** Disc Tech One, Inc., Seagate Technology (half height) **Warranty:** Boards, 90 days; head and disk assembly, 1 year **Comments:** Mail order	■				MS-DOS Mac					5¼"
Sider I, Sider II, B-Sider First Class Peripherals 3579 Highway 50 East Carson City, NV 89701 (800) 538-1307	**Price:** Sider 1 (10MB), $695; Sider II (20MB), $995; B-Sider (20MB), $695; shipping, $15 **Manufacturer:** Xebec **Warranty:** 1 year limited **Comments:** Mail order; First Class Peripherals will replace anything structurally wrong. $150 flat rate to repair after first year. 20MB formatted backup comes with two cartridges.	■	■	■	■		■			20	5¼"
RAM 10A Lobo Systems, Inc. 7334 Hollister Ave., Suite J Goleta, CA 93117 (805) 968-6929	**Price:** $1295; 10MB backup, $2295 **Manufacturer:** : Lobo Systems, Inc. **Warranty:** 1 year		■	■	■		■			10	5¼"
Plan 3000, Plan 5000 Nestar Systems, Inc. 2585 East Bayshore Road Palo Alto, CA 94303 (415) 493-2223	**Price:** Plan 3000, $15,000–$18,000; Plan 5000, $20,000–$55,000 **Manufacturer:** Plan 3000, Vertex Peripherals; Plan 5000, Priam Corp. **Warranty:** Hardware—90 days from date of shipment **Comments:** Local-area-network system, sharing peripheral resources—communication devices, printers, and plotters. Disk-storage file sharing with PC-to-PC communications. Backup system uses streaming-tape cartridges.		■	■	■		■			60	3000: 5¼" 5000: 8"
AF1 Series Peripheral Land 3677 Enochs Street Santa Clara, CA 95051 (408) 733-7600	**Price:** 10MB, $795; 20MB, $1295; 30MB, $1595 **Manufacturer:** MicroScience International Corp., TEAC Corp. of America **Warranty:** 90 days **Comments:** Backup—floppies. Can back up drives but not full 10 MB. Does boot from the hard disk.		■								5¼"
AF2 Series Peripheral Land 3677 Enochs Street Santa Clara, CA 95051 (408) 733-7600	**Price:** 10MB, $795; 20MB, $1295; 30MB, $1595; 10MB backup (AF2R), $1995 **Manufacturer:** MicroScience International Corp., TEAC Corp. of America, Tulin Corp. **Warranty:** 90 days	■						■			5¼"
AF3 Series Peripheral Land 3677 Enochs Street Santa Clara, CA 95051 (408) 733-7600	**Price:** 10MB, $895; 20MB, $1395 **Manufacturer:** MicroScience International Corp., TEAC Corp. of America **Warranty:** 90 days	■	■	■	■						5¼"
Fixed QC10, QC20 Quark Peripherals, Inc. 2525 W. Evans Ave., Ste. 220 Denver, CO 80219 (800) 543-7711 (Sales) (303) 934-2211 (Mktg)	**Price:** QC10, $1275; QC20, $1795 **Manufacturer:** Seagate Technology **Warranty:** 90 days: extended warranty can be purchased.	■		■		SOS					5¼"
Challenger (internal) Space Coast Systems, Inc. P.O. Box 2767 Titusville, FL 32781 (305) 268-0872	**Price:** 10MB, $1195; 20MB, $1595; backup, $1495 **Manufacturer:** LaPine Technology **Warranty:** 1 year **Comments:** Goes inside Apple IIe, optional external backup available. Backup system uses streaming-tape cartridges.	■	■	■	■	SOS MS-DOS	■				3.5"
Combination Unit Space Coast Systems, Inc. P.O. Box 2767 Titusville, FL 32781 (305) 268-0872	**Price:** 20MB, $2995; 42MB, $4550 **Manufacturer:** LaPine Technology **Warranty:** 1 year **Comments:** Backup system uses streaming-tape cartridges.	■	■	■	■	SOS	■				3.5"
SSD-10 Sunol Systems 1177 Quarry Pleasanton, CA 94566 (415) 484-3322	**Price:** 10MB, $3345; 16MB, $3845; 25MB, $4345; 45MB, $5945; 70MB, $6645 **Manufacturer:** Tandon Corp. **Warranty:** 60 months	■	■	■	■ 2.2	MS-DOS UNIX Xenix Mac					5¼"
TeamMate 2210, 2220 TeamMate 2775 Northwestern Parkway Santa Clara, CA 95051 (408) 986-9545	**Price:** 10MB, $995; 20MB, $1295 **Manufacturer:** Seagate Technology **Warranty:** 6 months	■	■	■	■	Mac Plus					5¼"

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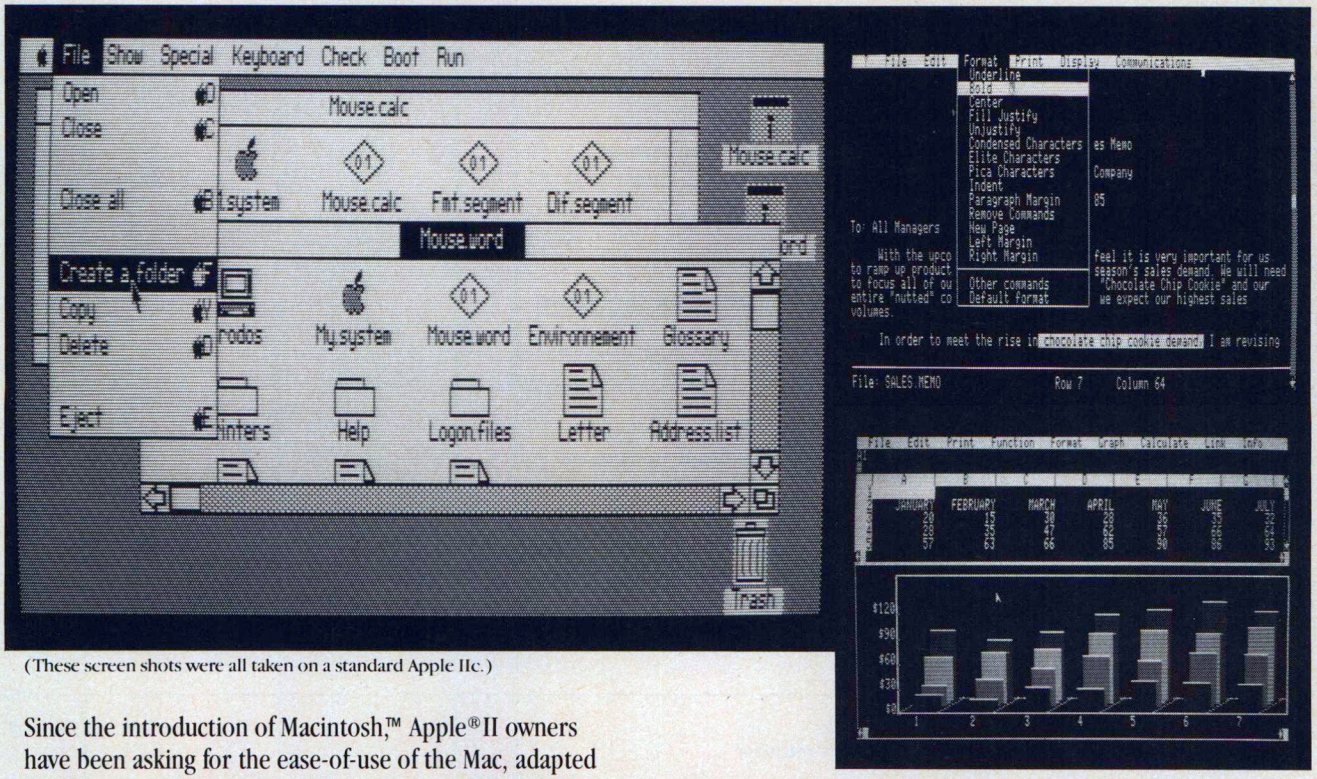

(These screen shots were all taken on a standard Apple IIc.)

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CIRCLE 191 ON READER SERVICE CARD

removable disk

		OPERATING SYSTEM					BACKUP			DISK	
		ProDOS	DOS 3.3	Pascal	CP/M	OTHER	FIXED HD	TAPE	REMOVABLE HD CARTRIDGE CAPACITY IN MB	FORMATTED	PLATTER SIZE
APPR Digital Electronic Systems 302 South Main Street Estill Springs, TN 37330 (615) 649-5137	**Price:** 10MB, $2660 **Manufacturer:** Syquest Technology **Warranty:** 6 months **Comments:** Can have two removable cartridges.	■	■	■	■				10	■	5¼"
Kodak 12MB Cartridge Disk Drive Eastman Kodak Co. 343 State Street Rochester, NY 14650 (716) 724-4000	**Price:** 10MB, $960 **Manufacturer:** Eastman Kodak Co. **Warranty:** 1 year **Comments:** Also need DOS driver and host adapter.	■	■	■	■	Mac				■	5¼"
XL 10+10 Genie Technologies Corp. 31117 Via Colinas Westlake Village, CA 91362 (818) 991-6210	**Price:** 10MB, $3695 **Manufacturer:** Ricoh of America, Inc. **Warranty:** 120 days **Comments:** The XL 10+10 has two removable 10-megabyte hard-disk cartridges.	■	■	2.2		MS-DOS PC-DOS		■	10	■	5¼"
XL 10A Genie Technologies Corp. 31117 Via Colinas Westlake Village, CA 91362 (818) 991-6210	**Price:** 10MB, $2495 **Manufacturer:** Ricoh of America, Inc. **Warranty:** 120 days **Comments:** The XL 10A has one removable 10-megabyte hard-disk cartridge.	■	■	2.2				■	10	■	5¼"
201A Infax, Inc. 5301 Covington Highway Decatur, GA 30035 (404) 981-6778	**Price:** 10MB, $2595 **Manufacturer:** Iomega **Warranty:** 90 days, parts and labor	■	■	■	■					■	8"
202A Infax, Inc. 5301 Covington Highway Decatur, GA 30035 (404) 981-6778	**Price:** 10MB, $3695 **Manufacturer:** Iomega **Warranty:** 90 days, parts and labor	■	■	■	■			■	10	■	8"
203A Infax, Inc. 5301 Covington Hwy. Decatur, GA 30035 (404) 981-6778	**Price:** 20MB, $3995 **Manufacturer:** Iomega **Warranty:** 90 days, parts and labor	■	■	■	■					■	8"
204A Infax, Inc. 5301 Covington Hwy. Decatur, GA 30035 (404) 981-6778	**Price:** 20MB, $4695 **Manufacturer:** Iomega **Warranty:** 90 days, parts and labor	■	■	■	■			■	20	■	8"
TeamMate 2200/R102 TeamMate 2775 Northwestern Parkway Santa Clara, CA 95051 (408) 986-9545	**Price:** 20MB, $2995 **Manufacturer:** Micro Storage Corp. **Warranty:** 6 months	■	■	■	■	Mac Plus		■		■	5¼"

1 fixed, 1 removable hard disk

11+11 Genie Technologies Corp. 31117 Via Colinas Westlake Village, CA 91362 (818) 991-6210	**Price:** 11MB, $3395 **Manufacturer:** MFM Technology, Inc. **Warranty:** 120 days **Comments:** The 11+11 offers one 11-megabyte fixed hard disk and one 11-megabyte removable hard-disk cartridge.	■	■		■	MS-DOS PC-DOS	■		11	■	5¼"
TeamMate 2200/R10 TeamMate 2775 Northwestern Parkway Santa Clara, CA 95051 (408) 986-9545	**Price:** 10MB, $1995 **Manufacturer:** Micro Storage Corp. **Warranty:** 6 months	■	■	■	■	Mac Plus	■			■	5¼"

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CIRCLE 343 ON READER SERVICE CARD

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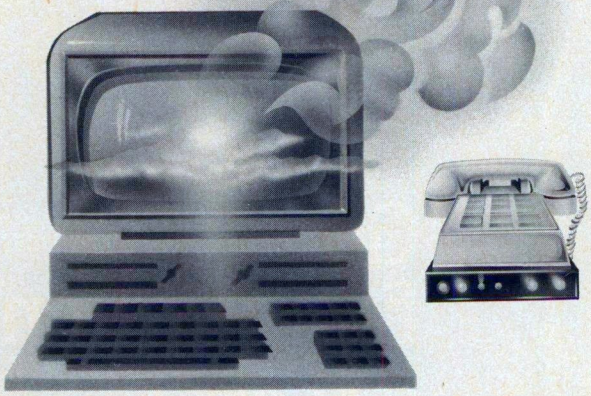

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A Glossary of Terms

BY STEVE ROSENTHAL

AppleWords

For use with the mass-storage article in this issue

BLOCK DEVICE
A device such as a disk drive that can read and write data only in chunks at a time, rather than byte by byte or bit by bit. The number of bytes in each chunk is normally called the block size. Almost all mass-storage devices are either inherently block devices or made in software to appear as if they were.

CACHE
A faster memory to which parts of the information in the main (slower) memory or disk are copied. Information that is likely to require reading or alteration goes to the cache, where the system can access it more quickly. Caching can significantly speed processing of some programs, especially if you're using floppy disks for mass storage.

CONTROLLER
The electronic board or unit that regulates the operation of a peripheral device. There are tape controllers, disk controllers, printer controllers, and so on. The controller takes the general commands from the computer system, converts them into the actual signals for controlling the device, and brings the data and status signals from the device into the computer in the appropriate form.

DAISY-CHAINING
A method of making connections to disk drives and other peripheral devices. Although, strictly speaking, a daisy-chain signal must go into each device and then out and on to the next, in practice a parallel connection that goes from the controller to several disk drives is usually referred to in this way.

DATA COMPATIBILITY
The ability of two or more computers to read from and write to each other's data disks or use each other's data files, even if they cannot run the same programs. Apple has a stated goal of data compatibility with the IBM PC.

DEVICE DRIVER
A special section of computer code that translates the general commands from an operating system or user programs into the exact code a specific peripheral device needs. Often, device drivers for a few standard peripherals are built into the operating system, but others must be added in installation or preboot routines.

DEVICE LEVEL
A description of the cable, bus, or other connection that goes between peripherals and their controller, or a standard that applies to peripherals. For example, the ST506 interface that commonly goes between Apple hard-disk drives and their controllers is a device-level interface.

EMBEDDED CONTROLLER
A controller (see above) that is built either into a peripheral such as a disk drive, or into the circuitry of the main board of the system unit. Merging the controller with another unit can cut costs and clutter, but it does reduce flexibility.

EXTERNAL DRIVE
A disk drive that sits in its own case, rather than being mounted in the chassis of the main computer. Often, external drives include their own power supply. Most supplementary drives for Apples are external models.

HOST ADAPTER
A board or circuit that connects a specific computer model to a more general controller. A few hard disks and other mass-storage peripherals for the Apple use this kind of configuration.

INCREMENTAL BACKUP
Making a copy of files that have changed since the last backup operation, rather than copying all the files on a hard disk. Incremental backups take less time than complete ones, but they require more sophisticated software to manage the backup and restoration processes.

LOGICAL FORMAT
The way that files are arranged on a disk and the way a directory or other pointers show what goes where. Sometimes two computers use the same physical format (see below) but different logical ones. In such a case, although the units won't be able to deal with other disks directly, they will be able to do so with a special transfer program. You can, for example, now get a Macintosh program that reads UniDisk 3.5-inch disks.

MEDIA COMPATIBILITY
The ability of two or more different-style units to use the same type of disks as blank disks, whether or not each can read data recorded by the other. Apple now has media compatibility between the UniDisk and the Macintosh Plus.

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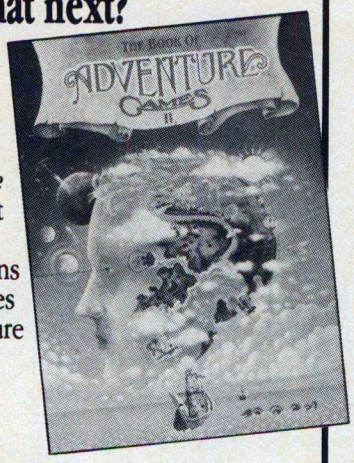

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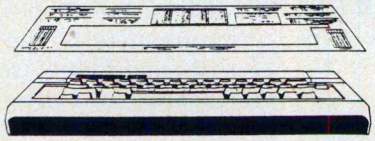

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AppleWords

MEDIA INTERCHANGEABILITY
The extent to which disks recorded on one machine can play back on another with the same type of drive. Media interchangeability is excellent for floppies, but some removable cartridge hard disks have problems with it.

NONVOLATILE MEMORY
Storage that retains its data even when power is removed. Disk drives and bubble-memory chips, for example, are nonvolatile, but the ordinary RAM chips of Apple main memory are not.

ON-LINE
Referring to storage, memory a computer can access without human intervention. Having large amounts of on-line capacity is handy and facilitates large database projects, but it is also expensive and means much data must be backed up.

PHYSICAL FORMAT
The general pattern of magnetic pulses and tracks on a disk or other medium, ignoring what those pulses mean when translated into digital 1s and 0s. Two computers using the same physical format can read each other's disks, but if their logical formats (see definition above) are not the same, they may not be able to make sense of the information.

SCSI
Short for Small Computer System Interface, an industry-standard interface between computers and peripheral-device controllers used by the Macintosh Plus and some other computers.

STREAMING CARTRIDGE
A type of cartridge tape drive that records whole tracks of a cartridge at one time, rather than stopping and starting for individual blocks. Because the mechanism is simpler, it is less expensive than incremental (start-stop) recorders and can hold more data per cartridge. Current capabilities are in the tens of megabytes per cartridge.

SYSTEM LEVEL
A description of the interface or connection that runs between computer subsystems such as the main board and disk controller or between parts of a multiprocessor computer. The SCSI interface used by the Macintosh Plus is a system-level interface.

VIRTUAL DISK
A section of memory treated as a disk drive through the use of special driver software. A virtual disk allows programs that would otherwise have to wait for the relatively slow mechanical operations of a disk drive to run at electronic speeds. It also is a good way for processors such as the Apple II family's 6502 to make use of much more memory than they were originally designed to handle.

VIRTUAL MEMORY
Storage that is actually provided on a disk drive or other mass-storage device but appears to programs to be part of the main memory of the computer. Thus, the programs seem to use more main memory than is actually provided.

For more details, see "AppleWords" in the April and October 1985 issues. ✚

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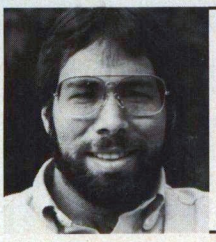

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HARDWARE *BY BRIAN CUTTER*

Setting up interface cards to work with your peripherals

Flip a DIP Switch

"No, George! A DIP switch is *not* something you use to check your oil. Don't touch anything; I'll be right over."

Too often the joy and excitement you feel when you unpack a new peripheral and interface card are vaporized by that fatal paragraph, usually near the beginning of the users' guide, that starts out, "Determine the proper DIP switch settings . . ." If you're like George above, you couldn't probably care less what a DIP switch *is* or *does*—you just want to "plug the darn thing in!" If that sounds like you, use the blank DIP Switch Information Chart in figure 1 (figure 2 is a sample filled-in chart). After examining your owners' manual, enter the manufacturer's categories and choices, appropriate to your peripheral, and then fill in the appropriate values for the switch settings.

Those of you who have purchased a used card, borrowed a printer or interface card, or do not have the owners' manual for some other reason, use the manufacturers' DIP-switch charts following this article to fill in the values on your own chart. (We have included the most common interface cards, from manufacturers that were able to supply us with manuals by press time.) Now you are ready to set your DIP switches.

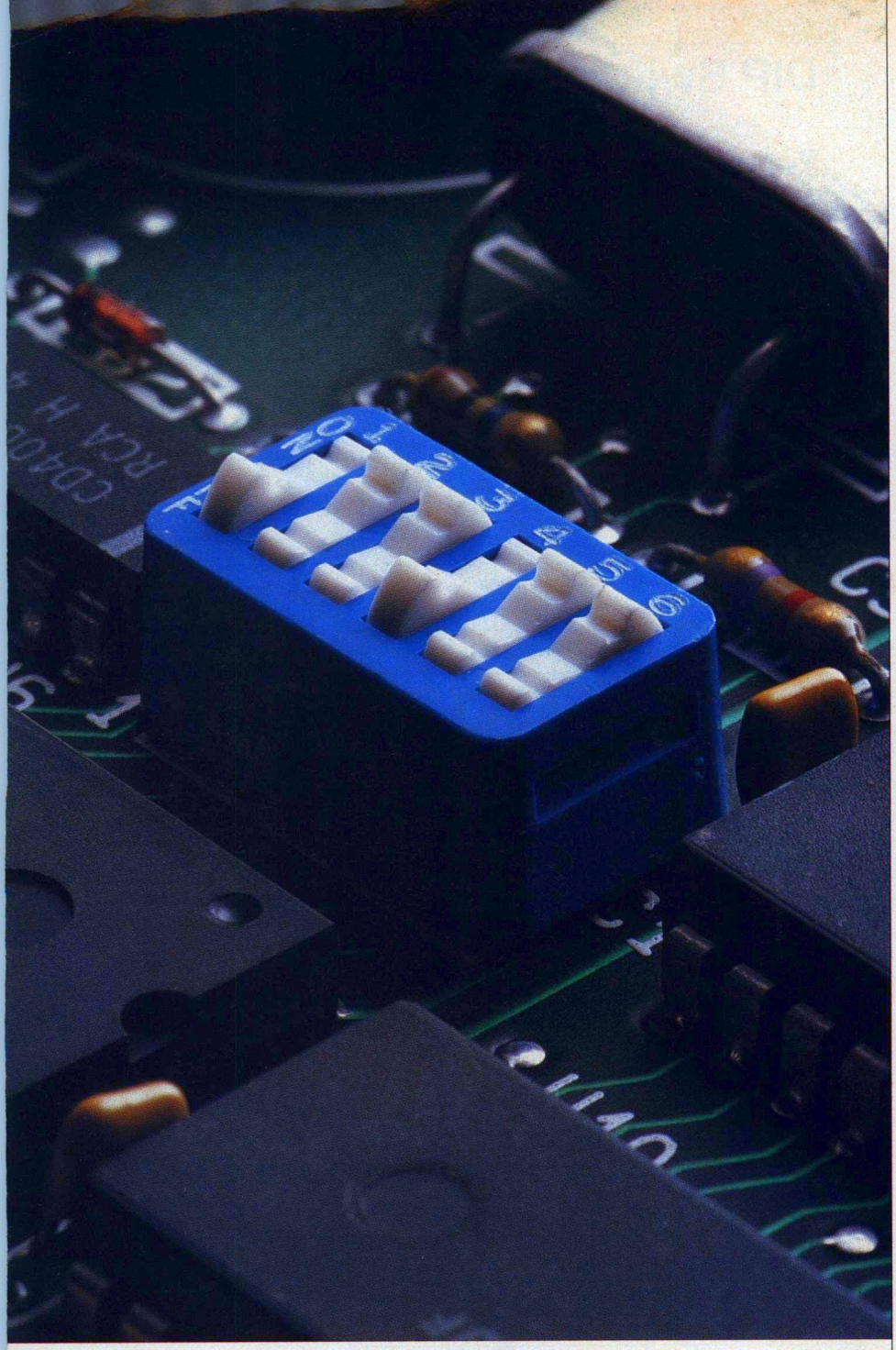
On the other hand, if you're more like the rescuer in the above scenario—or wish you were—you may want to brush up on what all of those DIP switches do, before you head off to the rescue. Remember, manufacturers' suggestions are just that: suggestions. It's time to learn what really happens when you flip a DIP switch.

What Is a DIP Switch?

DIP is short for *dual in-line pins* or *dual in-line package*. The switches have two long pins (hence *dual* and *pins*) extending downward from the switches that fit into two socket holes in the circuit board itself. These holes, usually grouped together in clusters, look like many :'s laid out in a line (hence *in-line*). Look inside your Apple, and you'll see that dual in-line pins are popular on many electrical components, including RAM (random-access-memory) chips; the CPU (central processing unit); and, of course, the DIP switches and their sockets.

You'll find DIP switches both on peripheral cards and on peripherals themselves (*peripheral* is compuspeak for a printer, modem, or even a computer terminal that connects directly to your Apple). So if you read, in December's *A+*, Gary Little's "Plug-In Devices for Every Need: Input/Output" and you've plunked your bucks down for beaucoup bytes or gobs of graphics, suddenly your world revolves around those DIP switches and baud rates, stop bits, and parity. In this article, I'll be concentrating on cards.

George again: "Why do I have to mess with these settings at all? Why can't they be factory-set for a typical setup and be done with it?" The problem is figuring out who defines typical. Apple Computer, Inc.? The third-party card manufacturers? You, the user? Who is to say? Apple knows what a hassle DIP switches can present. According



to Apple product manager Curtis Sasaki, Apple is currently working on developing a standard connector that won't need DIP switches.

Apparently, although the connector is still a couple of years from reaching the market, it will look like the connector—called a mini circular eight—that is on the back of the new ImageWriter II. Somehow it will sense what's coming in and what to send out without the need for DIP switches. In the meantime, the best that you can do is become comfortable enough with the terminology that the setting of the switches makes sense to you.

How It Works

A DIP switch works like any other switch does. You will understand switches most easily if you think of old toggle switches—now seen only in Frankenstein movies—large lever-like devices. Picture a light bulb and a battery connected by a wire to a switch: a simple electrical circuit. When the toggle is up, the circuit is said to be open, and the switch is off because the electricity can't reach the bulb. When the toggle is down, the circuit is closed and the switch is on.

Some DIP-switch manufacturers continue to label their switches the old-fashioned way—they label only one side and mark it OPEN. Remember that OPEN means *off*, not *on*. When a DIP switch is on, the circuit is closed, and current can pass through. Current, or the lack of current, represents information to your computer or peripheral, and just what that information is depends on the switch.

DIP Switch Information Chart

When we tear open a new package, whether it's a Christmas present or a brand-new interface card (or both), we have a tendency to want to, as George said, plug the darn thing in. Unfortunately, interface cards respond better to a little preparation. Take a moment to check the instructions that came with your peripheral. Somewhere, usually hidden between volumes of text, is most, if not all, of the information you'll need to fill out the DIP Switch Information Chart in figure 1 on the following page.

Because manufacturers' requirements vary so, you'll need to fill in the category and choice to make your peripheral work. The large DIP-switch grid in figure 1 should provide enough space for most DIP-switch schemes. Your interface card won't necessarily have two switch banks, and it may use any number of switches from none to 14.

If you were filling out the DIP Switch Information Chart in Figure 2, you would read the Sprint 11/40 manual to find out the rate at which the printer wants to communicate with the interface card, 9600 bps (or baud). So in the sample chart, you fill in Baud Rate under Category, and under Choice you write 9600. Now you need to determine the DIP-switch settings. Looking through your interface-card manual or our manufacturers' charts, you notice that one or more DIP switches represent specific functions. For example, on Apple's Super Serial card, DIP switches 1–4 on switch-bank 1 (SW1) determine the baud rate. For 9600 bps, DIP switches 1–3 should be off (0), and

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DIP Switch Information Chart

Peripheral

Serial # _____
Model _____
Manufacturer _____
Purchased at _____

Date _____
Service Contact _____
Phone _____

Interface Card

Serial # _____
Model _____
Manufacturer _____
Purchased at _____

Date _____
Service Contact _____
Phone _____

Enter peripheral's needs:

Category	Choice

SW1 1 2 3 4 5 6 7 8 9 SW2 1 2 3 4 5 6 7 8 9

Comments

DIP Switch Information Chart

Peripheral

Serial # _____
Model _____
Manufacturer _____
Purchased at _____

Date _____
Service Contact _____
Phone _____

Interface Card

Serial # _____
Model _____
Manufacturer _____
Purchased at _____

Date _____
Service Contact _____
Phone _____

Enter peripheral's needs:

SW1 1 2 3 4 5 6 7 8 9 SW2 1 2 3 4 5 6 7 8 9

Category	Choice	SW1	SW2
Baud Rate	9600	0 0 0 x	
Printer/Modem	p	0 x	
Parity	none		x
Stop Bits	1		
ATX/ACK, XON/XOFF	*1		0
Delay after CR	no		0 0
Line Width	132		x
Gen/Sup LF after CR	needs 1		
Full/Half Duplex	full		
			0
			0
Interrupt	*2 off	0	

Comments *1 can work with DTR, but this card doesn't use
*2 see discussion pg. 39 in SSC manual
remember to point the jumber block toward TERMINAL

Figure 1 (above): A blank DIP Switch Information Chart

Figure 2 (left): A sample of a filled-in DIP Switch Information Chart

cover of the reference manual. It'll help direct the research you must do to get your card installed; it'll make setup much easier; and, if you ever experience any trouble, the information the maintenance man, dealer, or hot-line firefighter asks for will be right at your fingertips. On the chart is a place to note any deviation from the manufacturer's suggestions. Now let's find out what all of these settings mean.

Baud rate refers to the number of signal events per second. In serial data transmission, it is equivalent to one bit per second, but in parallel communications it can refer to up to eight bits per second (on an eight-bit data bus). In order to emphasize this

DIP switch 4 should be on (x). You mark the chart accordingly and move to the next requirement of the printer and interface card.

I highly recommend that you take a few moments to fill out a chart for each of your peripherals and cards and tape the chart inside the front

distinction, *A+* uses the term bps (bits per second) to identify the baud rate of serial communications.

If that's too technical for you, just divide the transmission rate (baud or bps rate) by 10 and you've got, roughly, characters per second. Since baud rate is the one DIP-switch setting that is liable to have the most choices, you usually need to set several switches to select a particular baud rate. For example, on Apple's Super Serial Card, you must concern yourself with switches SW1 (meaning the first bank of switches), numbers 1–4. These four switches can allow the interface card to handle baud rates between 50 and 19,200 bps.

If your modem is talking at 2400 bps, your computer has to be listening at 2400 bps, and vice versa. The inter- (*between*) -face card takes care of both sending and receiving information at those speeds. Check your peripheral's owners' manual to see at what speed your peripheral transmits or receives information, and then record this on the DIP Switch Information chart in the column at the left. If you're hooking up a modem for communicating to a remote computer, you also have to find out what speed the remote computer uses.

Printer or Modem

An interface card needs to act a certain way if its job is two-way, remote communication—as with a modem, and act another way if its job is local communication—as with a printer. Many cards have DIP switches that you need to set if the cards are to act locally or remotely. Different manufacturers give you different degrees of explanation and use different terminology, but they usually summarize by telling you to set switch *x* to ON if you are interfacing to a modem and to OFF if you are interfacing to a printer.

Try to locate any such recommendations from the interface card's manual and note them on your chart.

While we are on the subject of unusual features: Some cards, such as the Super Serial Card, also have a jumper block that has to be pointing to TERMINAL if you're hooking up a printer, another Apple directly, or a terminal, and pointing to MODEM if you're hooking up a modem. What this jumper block (known as a modem eliminator) does is to eliminate the interface card's tendency to speak as if it were talking to a modem, allowing it to communicate correctly with a printer.

Fill out a chart for each of your peripherals and cards and tape it inside your reference manual.

Technically, a serial card usually talks as if it were speaking to DTE (data terminal equipment) through two intermediary DCEs (data communications equipment), also known as modems. The key word here is *communications* (from the Latin root *communicatus*, meaning *to share*). Most interface cards are set for sharing, sending information back and forth, but if the card is talking directly to DTE (from the Latin root *terminus*, meaning *end*), it's not sharing in a back-and-forth fashion. It's mostly sending one way and *end*ing at the DTE, which means you must either change some DIP switches, move a jumper block, or use a null-modem cable—more on cables in next month's issue—so you can use the card with a modem.

So, to use the chart, if your users' guide lists certain switches for a modem or a printer, make note of them. If it lists a special jumper block or even certain DIP switches for a modem eliminator, know that it allows you to configure your card for a printer or a modem. Finally, if it lists DTE (think of *terminus*), it's talking about printers, and with DCE (think of communicating), it's talking about modems.

When devices are communicating, they use either the very fast, but expensive, Synchronous mode (the word *synchronous* applies because the transmitting and receiving devices must be in synchrony for this method to work) or the slower but more affordable Asynchronous mode. In the Asynchronous mode, only one character at a time is sent down the line. Each character also has a start bit, one or two stop bits, and a parity bit tacked on. With these three or four extra bits per character, it's easy to see why this method is slower!

Your owners' manual may specify synchronous or asynchronous and recommend that switches be set accordingly. Much more likely, since most interface cards for Apple com-

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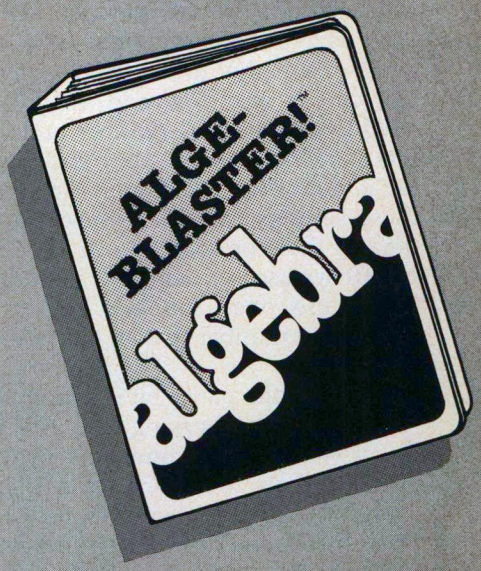

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puters use the Asynchronous mode, is that the manual has some other parameters, based on asynchronous transmission. When devices send data asynchronously, they have to agree on whether to send and receive one or two stop bits, and they also need to agree on the number of data bits sent between the start and stop bit(s). Your owners' manual may call these settings the *data format*. Most devices that communicate at 50, 75, or 110 bps use two stop bits; all of the others use one. You also need to specify the number of data bits in the data format.

Use of the parity bit is a method of error checking. An ASCII character is composed of 1s and 0s in binary format. In even parity, the number of 1s must be even, and in odd parity, the number of 1s must be odd. A 1 or 0 bit is tacked onto the beginning of an ASCII character to make the total number of 1s even or odd, to match even or odd parity. For example, using even parity, if a character has an even number of 1s, the parity bit is set to 0; if a character has an odd number of 1s, the parity bit is set to 1.

Both communication devices have to agree on whether they will check for errors using even or odd parity. If they agree on even and the receiving device gets a character with an odd number of 1s, for instance, it sends back an error message, and the sender tries again. If your manual says parity is none, it means that your device doesn't check this bit.

Your printer needs a way to stop the computer from overflowing its buffer.

Handshaking and Flow Control

When you shake somebody's hand, he or she shakes back. For our discussion, you should know that some printers, especially letter-quality printers, need this type of greeting too. At the end of every line, the computer may extend its "hand" by sending the printer a Control-C character (also known as an ETX, or end of transmission). When the printer gets this character, it puts out its "hand" when it's ready (its buffer, or storage area, is cleared and ready for some more data) by sending the printer a Control-F (also known as ACK, or acknowledge)—a signal to the computer to send more data—hence the computer term *handshaking*.

If your printer doesn't use handshaking, it needs another way to stop the computer from overflowing its buffer. Computers are almost always faster than their peripherals, so the printer-configuration menus of some application programs let you specify a delay at the end of each line. The delay does the same thing as the handshake, offering plenty of time for the peripheral to catch up. This delay is usually expressed in milliseconds (abbreviated *ms*), thousandths of a second. Two other methods of controlling the flow are the XON/XOFF and RTS/CTS (Request to Send/Clear to Send) signals. These signals too are means of telling the computer when to send and not to send data, based on whether the buffer is almost full. Make a note of which method your peripheral uses.

Some cards also dedicate actual physical lines (wires) to handshaking. The Videx Uniprint is one such card; it either constantly sends a high level

MacroWorks™ makes AppleWorks™ work the way it should have in the first place.

New word processing power

MacroWorks streamlines AppleWorks word processing with a multitude of new features. For example, one quick keystroke now deletes the *character* or the *word* at the cursor.

```
Return to our xxxxx office:

    Harvey R. Smith
    6502 Disk Drive
    Uptown, CA 92103
```

Macros let you type almost anything with just one keystroke.

Use one keystroke* to jump to the start or end of a line of text. Another keystroke will erase an entire line. Change your mind? Apple-U will instantly "Undo" your last delete command!

AppleWorks Macros

MacroWorks will convert any series of keystrokes into a new one-keystroke AppleWorks command. Use MacroWorks' built-in macros, or define your own. For example, make Apple-N type your name and address. Or let Apple-X Save or Print *all* of your desktop files, nonstop.

For AppleWorks' Word Processor, Data Base and Spreadsheet

The possibilities are endless. For example, you may want to skip unwanted questions like *"How many copies?"* and *"Are you sure...?"*. Or search and replace printer commands (change all underlined words to bold, etc.).

** These are Solid-Apple commands. All original commands stay intact.*

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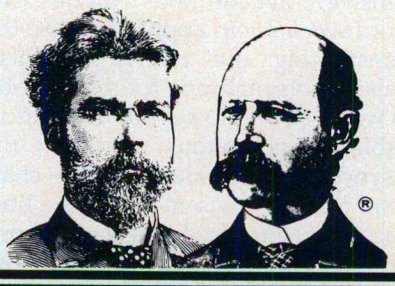
MacroWorks is *not* a time-consuming "pre-boot" disk. You boot AppleWorks like you always do, but now you've got MacroWorks' new features!

Customized Help!

MacroWorks lets you replace AppleWorks' Help screens with new information, like a list of new commands or important names and addresses.



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MacroWorks' *File Analyzer* program prints a sorted list of every word it finds, and reports the number of occurrences of each word, and the average word length. Great for making an index or glossary, or for analyzing your writing style.

```
COUNT  WORD
-----  ----------
  10   A
   1   ADDRESS
   1   ADDRESSES
   6   ALL
   1   ALMOST
   1   ALWAYS
```

```
  1   WORK
  1   WRITING
  9   YOU
  1   YOU'VE
  8   YOUR
  ----------
TOTAL WORDS: 402
CHARACTERS : 2013
CHARS/WORD : 5.0
```

Alphabetize your catalogs

MacroWorks' *Alpha-Cat* program prints a sorted list of all the files (or just the AppleWorks files) on a disk. Perfect for disk I. D. labels!

$34.95 Friendly and unprotected

MacroWorks is easy-to-use, unprotected and compatible with all Apple IIc's and 128K IIe's. Like all Beagle Bros disks, you can make backups without hassle or special software.

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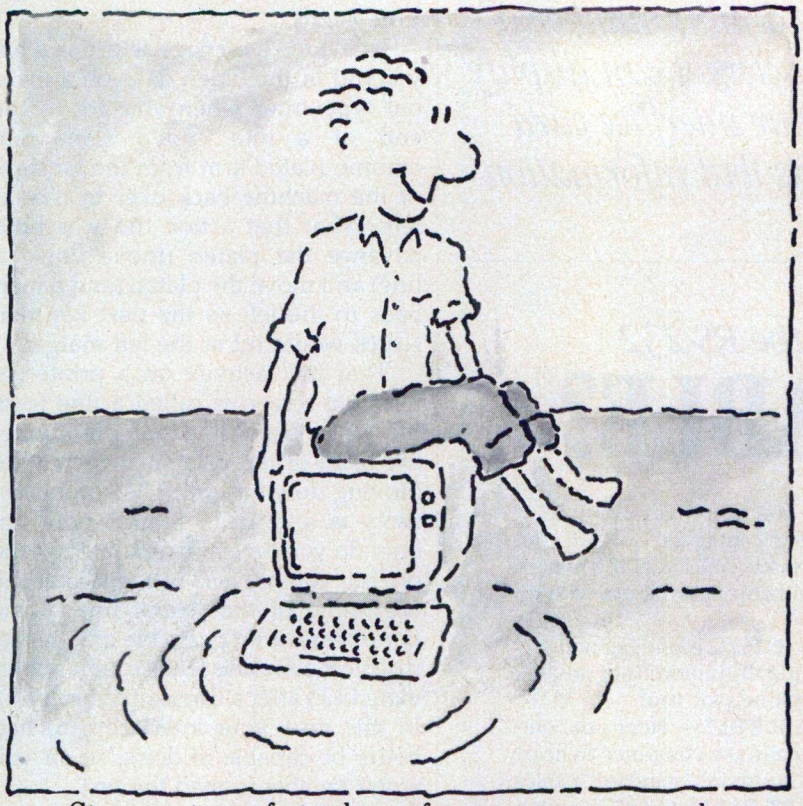
CIRCLE 148 ON READER SERVICE CARD

GET YOUR FEET WET.



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of voltage and then dips to low when it's ready to send data, if DIP switch 8 is on, or vice versa (low to high) if the switch is off. Check the owners' manual of the parallel printer you are interfacing to see which kind of polarity it needs. The SeriALL card asks you to change the position of a jumper block (which acts as a switch) for hardware handshaking.

Line Width

Whether your peripheral is a printer or a terminal, it has a maximum number of characters it can display. Your interface card needs that information, which you can find in the peripheral's owners' manual, so it can know when it gets to the end of a line on your peripheral—so mark it down in the chart.

Whether your peripheral is a printer or a terminal, it has a maximum number of characters it can display. Your interface card needs that information.

Line Feeds

A line feed, carriage return is what you did in the olden days on a manual typewriter when you got to the end of a line. You'd slam that chrome-plated arm from the far right of the machine back over to the far left. What that action did was both advance the platen (move down a line) and move the platen (and paper) back to the left so the next key that struck would hit at the left margin.

That first activity on a printer or terminal screen is called a line feed; think of a blank line being fed under the head of the printer or the cursor moving down a line. The second activity is a carriage return; now not only do you have a blank line to type on, but you are also at the left, at the beginning of that blank line. Some peripherals aren't capable of generating their own line feeds (often abbreviated LF) after a carriage return (CR). In this case, your interface card had better be capable of doing so, or you won't be able to read the text.

Special Switches

Most card manufacturers put special switches on their products to perform special services. These services are either unique to their card or antiquated. The chart has several blank lines for you to label and describe these special switches, but you should do so only if your peripheral has them.

For example, the Super Serial Card allows a nonstandard pin (look at the end of your connector cable) for the Secondary Clear to Send signal (a type of handshaking). Look up Secondary Clear to Send in your peripherals index, and if it doesn't mention the term, don't worry. If the index does mention this signal, read about it and see if your peripheral uses pin 19 for Secondary Clear to Send, rather than pin 4 or 20, and if so, note it on your chart.

Setting the Switches

Your chart should now have several figures down the leftmost column. Don't feel you need information in every space. You don't—you'll have several blanks, depending on the information in your owners' manual.

Now that you have all of the pertinent information on your peripheral,

Are you a victim of the RS-232

CABLE FABLE?

Which one have you heard? For example: "It has a 'standard' RS232 interface," or "All you need is a standard printer cable," or "If you have the manuals, I can probably figure it out with my breakout box."

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Smart Cable is the first truly universal connector for RS232 interfaces. Use it to connect any computer to any RS232 device. Don't let "cable fables" confound you any longer. Start making intelligent connections with Smart Cable.

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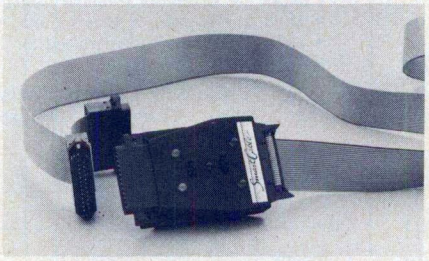

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CIRCLE 335 ON READER SERVICE CARD

you need to check the owners' manual of your interface card to determine the switch settings required for compatibility with your peripheral. Mark an X in the chart below the switches that you're supposed to turn on and a 0 in those that should be off. If any of the switches have neither an X nor a 0, you have to do a little more research. The easiest way is to look for the switch number in the manual, see what it affects, and then try to find that effect described earlier in this article. Then the switch's function will be much easier to understand in the peripheral's users' guide, where you'll need to find mention of the switch to find out how to set it on the card.

After you have some value for each switch, you are ready to set the switches. Don't touch the gold fingers along the bottom edge of the card. Lay the card on something soft and use a ballpoint pen to set the switches. Glance down each switch's column in your DIP Switch Information Chart and set the switches accordingly.

When your card is ready to install, you need to discharge static electricity from yourself. With your Apple computer plugged into a grounded wall socket, but *with the machine turned off*, touch the power pack inside an Apple II or touch the connector on the back of a Mac or a IIc with your finger to discharge any static electricity. Then gently push and rock the card into place. Close the computer up, and you are all set.

Didn't work? Usually you'll encounter degrees of not working. If, for instance, your printer has been typing over and over again on the same line, it isn't generating line feeds. Or it is, and your card is cancelling them out.

If your printer is always double-spacing, it probably automatically sends line feeds at the end of each line and your interface card is set to do so also. Check the owners' manual to see if your printer generates line feeds itself, in which case your interface card won't have to, or see if it is incapable of sending them, in which case your card must.

Garbage characters from a modem usually signal the wrong baud rate, but the problem can be the number of data and stop bits too. Words apparently being cut off at the same place in each line of a page is most assuredly an instance of wrong line-width setting.

You'll probably be able to solve anything that comes up if you review the descriptions above, but if you seek help, bring the chart along to let your resident techie or dealer know that you gave it your best shot. Be sure to mark your new configuration (compuspeak for the way your switches are set) on your chart and mention why you made the change. You'll be surprised how much you forget in a year's time, and DIP switches are usually not something you need very often.

Next month I'll tell you how to make your own connector cable. The one on my Mac cost only 50¢, but I've seen them retail for $40. If you've already got a connector card, you might want to find out if you can use the same cord for other peripherals. ✚

Brian Cutter is a writer who writes users' guides for VAX mainframe-class financial software during the day, Apple articles in the early evening, MAUG missives at night, and Pascal poetry in the wee hours.

Does your interface give you

A LONG FACE?

It's sad! The hours that people spend trying to get two pieces of hardware interfaced through the serial ports. They buy "standard" cables that don't work! They call the "Tech Assistance" line and that's busy. They fiddle for hours with a breakout box and still don't get the correct pin configuration.

Well, now they can smile and use those hours for something productive!

The **SMART CABLEMAKER SC821** has arrived.

Unlike other cable devices claiming to resolve RS232 connections, SC821PLUS's LED display gives a complete graphic display of the interface. And you know the interface is correct because your system is already up and running.

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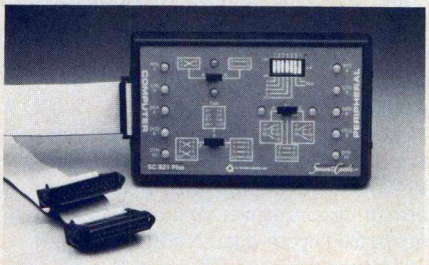

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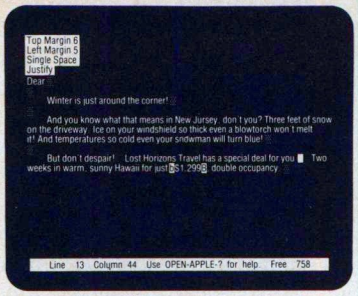
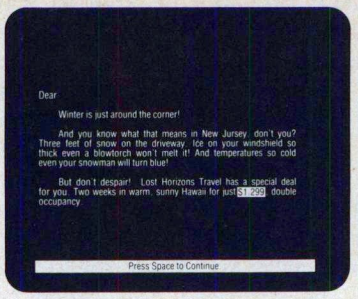
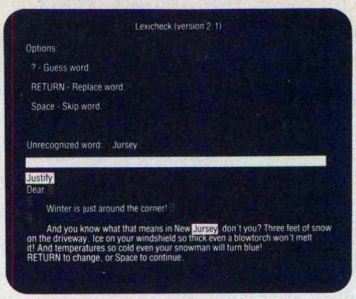
CIRCLE 336 ON READER SERVICE CARD



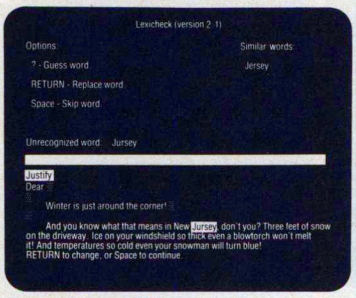
Text Entry



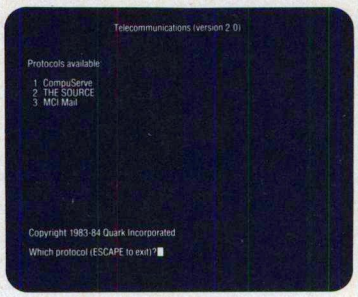
Display



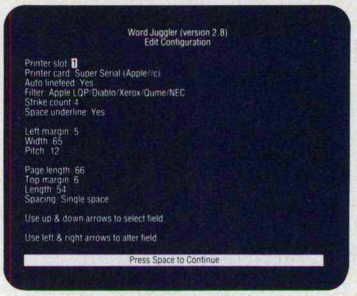
Spelling Checker



Word Guess™ Plus



Telecommunications



Configuration Menu

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CIRCLE 312 ON READER SERVICE CARD

DIP-Switch Atlas
OF MAJOR INTERFACE CARDS

These charts condense the DIP-switch configurations of some major interface cards and represent the range of DIP-switch configurations from cards with 14 DIP switches to cards with none. Some cards do not have physical DIP switches; you use software-selectable switches to configure them for similar functions.

Software-selectable or physical DIP switches simply let you open or close electrical connections and offer the flexibility to configure interface cards to work with a wide variety of peripheral devices, usually printers and modems. You can buy one interface card and, after you've correctly configured the DIP switches, your computer will be able to work with scores of different printers and modems.

The boldface headings in the charts indicate the function of the DIP switch or switches. The subheadings show the possible choices for each function. Serial cards usually have baud-rate selections, and intelligent parallel cards usually have dot-matrix printer selections. Many cards have unique functions.

Because manufacturers' requirements vary so greatly, you will need to fill in the "Category" and "Choice" for your peripheral's needs in the blank chart (see figure 1 in the preceding article).

We have provided a large DIP-switch grid that should provide sufficient space for most DIP-switch schemes you will encounter.

SERIALL

The SeriALL card from Practical Peripherals is an intelligent serial-interface card that is fully hardware-compatible with Apple's Super Serial card and allows you to print graphics with the specified printers.

SWITCH BANK 1 (SW1)	1	2	3	4	5	6	7	8
HANDSHAKING*								
X-ON/X-OFF	X							
HARDWARE HANDSHAKE	X							
NO HANDSHAKE	X							
ETX/ACK	0							
MODE SELECTION								
MODEM	X							
PRINTER	0							
PRINTER GRAPHICS								
ANY EPSON			X	X	X			
NEC 8023A			0	X	X			
C. ITOH PRO			0	X	X			
ANY ANADEX			X	0	X			
ANY IDS			0	0	0			
OKIDATA 84			X	X	0			
OTHER OKIDATA			0	X	0			
APPLE DMP			X	0	0			
APPLE IMAGEWRITER			X	0	0			
ANY MANNESMANN TALLY			0	0	0			
AUTOMATIC BAUD RATE								
YES						X		
NO						0		
GEN LF AFTER CR								
YES							X	
NO							0	
SPECIAL SWITCHES								
INTERRUPTS ON								X
INTERRUPTS OFF								0

SWITCH BANK 2 (SW2)	1	2	3	4	5	6	7	8
BAUD RATE (BPS)								
UNDEFINED	X	X	X	X				
50	X	X	X	0				
75	X	X	0	X				
110	X	X	0	0				
135	X	0	X	X				
300	X	0	0	X				
600	X	0	0	0				
1200	0	X	X	X				
1800	0	X	X	0				
2400	0	X	0	X				
3600	0	X	0	0				
4800	0	0	X	X				
7200	0	0	X	0				
9600	0	0	0	X				
19200K	0	0	0	0				
STOP BITS								
1					X			
2					0			
DATA BITS								
8						X		
7						0		
PARITY								
ON							X	
OFF							0	
ODD						X		
EVEN						0		

*Contains a jumper, or connecting wire, for handshaking.

APPLE SUPER SERIAL CARD

The Super Serial Card from Apple provides a two-way serial interface to a wide variety of devices, including printers, terminals, plotters, and other computers. Configuring this card usually involves setting the DIP switches on the card, but you can also configure it by typing commands from the keyboard or from within a program.

SWITCH BANK 1 (SW1)	1	2	3	4	5	6	7
MODE SELECTION							
MODEM					X	X	
PRINTER					0	X	
SPECIAL SWITCHES							
SIC P8 EMULATION					X	0	
SIC O8A EMULATION					0	0	
NORMAL CLEAR TO SEND							X
SECONDARY CLEAR TO SEND							0
BAUD RATE (BITS PER SECOND)							
UNDEFINED	X	X	X	X			
50	X	X	X	0			
75	X	X	0	X			
109.92	X	X	0	0			
134.58	X	0	X	X			
150	X	0	X	0			
300	X	0	0	X			
600	X	0	0	0			
1200	0	X	X	X			
1800	0	X	X	0			
2400	0	X	0	X			
3600	0	X	0	0			
4800	0	0	X	X			
7200	0	0	X	0			
9600	0	0	0	X			
19200	0	0	0	0			

SWITCH BANK 2 (SW2)	1	2	3	4	5	6	7
DATA FORMAT (IN BITS)							
8 DATA, 1 STOP	X						
8 DATA, 2 STOP	0						
DELAY AFTER CR							
YES		0					
NO		X					
LINE WIDTH (# OF CHARS.)							
40			X	X			
72			X	0			
80			0	X			
132			0	0			
GENERATE LF AFTER CR							
YES					X		
NO					0		
SPECIAL SWITCHES							
INTERRUPTS OFF						0	
INTERRUPTS ON						X	
NORMAL CLEAR TO SEND							0
SECONDARY CLEAR TO SEND							X
RS-232C SIGNAL							0
PARITY							
NONE				X			
OFF			X	0			
EVEN			0	0			

MICROBUFFER II+

The Microbuffer II+ from Practical Peripherals, Inc., is a parallel-interface card for the Apple II, II Plus, and IIe. It allows you to print graphics for the specified printers and lets you clear the printer's memory buffer with a key press. This card uses jumpers for hardware handshaking instead of using software handshaking.

SWITCHES	1	2	3	4	5
PRINTER GRAPHICS					
ANY EPSON	X	X	X		
NEC 8023A	0	X	X		
C. ITOH PROWRITER	0	X	X		
ANY ANADEX	X	0	X		
ANY IDS	0	0	X		
OKIDATA 84	X	X	0		
OTHER OKIDATA	0	X	0		
ANY APPLE	X	0	0		
ANY MANNESMANN TALLY	0	0	0		
CLEAR BUFFER MEMORY					
ENABLE*				X	
DISABLE				0	
BAUD RATE (BPS)					
300					0
1200					X

THE GRAPPLER+

The Grappler+ from Orange Micro, Inc., is a printer-interface card that allows you to print, or dump, the contents of the graphics and text screens. Most of the card's switches are set at the factory. The DIP-switch settings assure that the card's method of printing graphics is compatible with your printer.

SWITCHES	1	2	3	4
PRINTER GRAPHICS	0	X	0	0
ANY APPLE	0	0	X	0
C. ITOH 8510DP	0	X	X	X
C. ITOH PROWRITER	0	X	X	0
ANY EPSON	0	X	X	X
HP THINKJET	0	X	X	X
NEC 8023	0	X	X	0
OKIDATA 84 WITHOUT STEP II	0	0	0	X
ANY OTHER OKIDATA	0	0	X	X
PANASONIC KXP-1090	0	X	X	X
SMITH-CORONA D100-300	0	X	X	X
ANY STAR MICRONICS	0	X	0	X

*Apple II: press Reset
Apple IIe: press Control/open-apple/Reset

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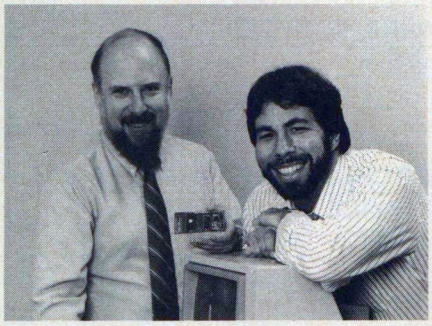
Steve Wozniak calls it revolutionary, adding "If I had thought of the SwyftCard while creating the Apple II, I would have built it in." Fomenting revolutions comes naturally to SwyftCard inventor Jef Raskin, whose previous efforts to make computers simple and useful include creating the Macintosh™ project at Apple.



SwyftCard creator Jef Raskin and Apple II creator Steve Wozniak

SwyftCard transforms the Apple IIe into the computer it ought to be.

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SwyftCard saves an entire universe to a disk in just eight seconds, including automatic formatting if necessary.

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For all it does, SwyftCard uses only seven commands. And each is available immediately by pressing a single key once.

To start using SwyftCard, simply plug the card into Slot 3 (which most other cards can't use), turn the Apple IIe power on, wait six seconds and begin typing.

To use an Apple program, just load it in; SwyftCard turns itself off and won't interfere.

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Information Appliance Inc.

VERSACARD

The Versacard from Prometheus Products, Inc., is a multifunction card with a serial interface, a parallel interface, a clock, and a BSR/X-10 controller that interfaces with the BSR/X-10 home-appliance controller.

SWITCH BANK 1 (SW1)	1	2	3	4	5	6
PHANTOM SLOTTING						
FOR A PARALLEL PORT						
SLOT 1	0	X	X			
SLOT 2	X	0	X			
SLOT 3	0	0	X			
SLOT 4	X	X	0			
SLOT 5	0	X	0			
SLOT 6	X	0	0			
SLOT 7	0	0	0			
FOR CLOCK/BSR						
SLOT 1				0	X	X
SLOT 2				X	0	X
SLOT 3				X	X	0
SLOT 4				X	X	0
SLOT 5				0	X	0
SLOT 6				X	0	0
SLOT 7				0	0	0

SWITCH BANK 2 (SW2)	1	2	3	4	5	6
BAUD RATE (BPS)						
UNDEFINED	0					
50		X	X	X	X	
75		X	X	X	0	
110		X	X	0	X	
134.5		X	X	0	0	
150		X	0	X	X	
300		X	0	X	0	
600		X	0	0	X	
1200		X	0	0	0	
1800		0	X	X	X	
2000		0	X	X	0	
2400		0	X	0	X	
3600		0	X	0	0	
4800		0	0	X	X	
7200		0	0	X	0	
9600		0	0	0	X	
19200		0	0	0	0	
CLOCK						
SET						X
WRITE PROTECT*						0

*Prevents accidental setting

VIDEX UNIPRINT PARALLEL PRINTER INTERFACE CARD

The Uniprint card from Videx, Inc., uses a type of handshaking called signal polarity. The card devotes one line on the cable to the strobe signal, which tells the printer when data is available, and it devotes another line to the acknowledge signal, in which the printer tells the card when it is ready for more data. For more details, read the handshaking section in the text.

SWITCHES	1	2	3	4	5	6	7	8	9
PRINTER GRAPHICS									
ANY APPLE	0	0	0						
PROWRITER	0	0	0						
ANY NEC	0	0	0						
ANY EPSON	0	0	X						
ANY GEMINI	0	0	X						
ANY DATAPRODUCTS	0	X	X						
ANY IDS	0	X	X						
ANY OKIDATA	0	X	X						
ANADEX 9500/9501	X	0	0						
GORILLA BANANA	X	X	0						
RADIO SHACK DMP-100	X	X	0						
CENTRONICS 739-1	X	X	0						
LINE WIDTH (# OF CHARS.)									
NONE				0	0				
80				0	X				
96				X	0				
132				X	X				
PAGE LENGTH (LINES)									
NONE						0	0		
54						0	X		
57						X	0		
60						X	X		
STROBE POLARITY									
NEGATIVE								X	
POSITIVE								0	
ACKNOWLEDGE POLARITY									
NEGATIVE									X
POSITIVE									0

ALPHABITS SERIAL INTERFACE CARD

The Alphabits interface card from Street Electronics Corporation configures itself according to the slot you put it in. You can change the default values by entering commands from the keyboard. The standard slot configurations are as follows:

IN SLOT 1 (recommended for printing)

BAUD RATE (BPS)	9600
DATA FORMAT (IN BITS)	8 DATA, 2 STOP, NO PARITY
LINE LENGTH	80 CHARACTERS
SCREEN ECHO	OFF
GEN LF AFTER CR	YES (no if Pascal or CP/M)

IN SLOT 2 (recommended for communications)

BAUD RATE (BPS)	300
DATA FORMAT (IN BITS)	8 DATA, 1 STOP, NO PARITY
LINE LENGTH	DISABLED
SCREEN ECHO	OFF
GEN LF AFTER CR	NO

VIDEX'S PSIO

The PSIO card from Videx, Inc., is a dual-function interface card. It contains the circuitry for two interfaces. The extra interface is assigned to an unused slot, although the card does not physically occupy that slot—a method called phantom slotting. The card's features are software-selectable with a utility disk that comes with the card.

SWITCHES	1	2	3
PHANTOM SLOTTING			
SLOT 1	X	0	0
SLOT 2	0	X	0
SLOT 3	X	X	0
SLOT 4	0	0	X
SLOT 5	X	0	X
SLOT 6	0	X	X
SLOT 7	X	X	X
NONE	0	0	0

THE GRAPPLER

The Grappler from Orange Micro, Inc., is a printer-interface card that allows you to print text and graphics. Move the interface's DIP switches to the Dumb setting if you experience printing problems when first using this card with your printer; your printer and the card may be interfering with one another.

SWITCHES	1	2	3	4
INTERFACE				
INTELLIGENT	X	X	X	X
DUMB	0	X	X	X

MULTICORE

The Multicore card from Quadram is a multifunction card (serial, parallel, clock, and RAMdisk). It too uses phantom slotting and lets you use software on a disk to set the various software parameters associated with each of the phantom slots. The card itself has no DIP switches.

PKASO/U

The Pkaso/U interface card from Interactive Structures, Inc., is an intelligent interface card that allows you to print, or dump, the contents of the graphics and text screens. This card contains no DIP switches; its functions are software-selectable.

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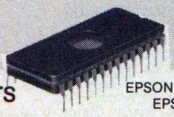

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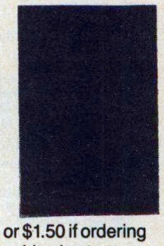

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SOFTWARE *BY SUSAN JANUS*

Software Planting Mix

With the coming of spring each year, gardeners' thoughts turn to the magical combination of seeds, soil, rain, and sun. For centuries, except in drought or flood, this magic has never failed us. Every year at this time, hoes, shovels, rakes, and their 20th-century cousin the rototiller shake off the dust of winter storage to begin preparing for that simplest of all miracles, the sprouting of the seed that holds within its tiny case the bounty of the harvest.

If you find yourself checking the cover of this magazine to see if you accidentally picked up *Organic Gardening* or *Better Homes and Gardens*, then rest assured. This is *A+*—and the point is that now there's another 20th-century ingredient to add to the ancient springtime ritual of planting and cultivating. Computers and gardening seem like an improbable combination, but today several software programs are available to gardeners and landscapers that offer assistance in the planning, organizing, and record-keeping stages.

Horticulture on Disk

This review will explore four gardening-software products. The first two, Plantin' Pal by Home & Hobby Software, Inc., and The Gardener's Assistant by Shannon Software Ltd., are both designed to help you create a customized vegetable-garden plan prior to planting. Both programs allow you to print out your plan once it is complete, so you can go straight from your computer to your garden plot and begin planting.

The Ortho Personalized Plant Selector by Ortho Information Services provides gardeners with an extensive database of plant information. The program works like a huge plant encyclopedia with various sorting capabilities.

Last but not least, in a category all its own, is Design Your Own Home Landscape by Avant-Garde Publishing Corporation. This program is the most complex of the four and requires a significant time investment on your part to get complete, full-color landscape drawings.

Yearning for a bountiful harvest or a professional landscaping job this year? One of these four software packages can help you create the customized, landscaped garden of your dreams.

The Product Information listing at the end of this article includes one more program, The Landscaper, which we were unable to review.

Vegetables

Plantin' Pal is aptly named. This program is fun and easy to use and gives you all the benefits that are listed on its package. The manual is well organized and leads you quickly and easily through all the steps necessary to create your own customized garden plan.

Plantin' Pal uses wide-row (20-inch) gardening, a technique I find superior to single-row planting. Wide-row gardening makes the most efficient use of your garden plot, cutting down on weed growth and path space, thereby maximizing the yield of your harvest.

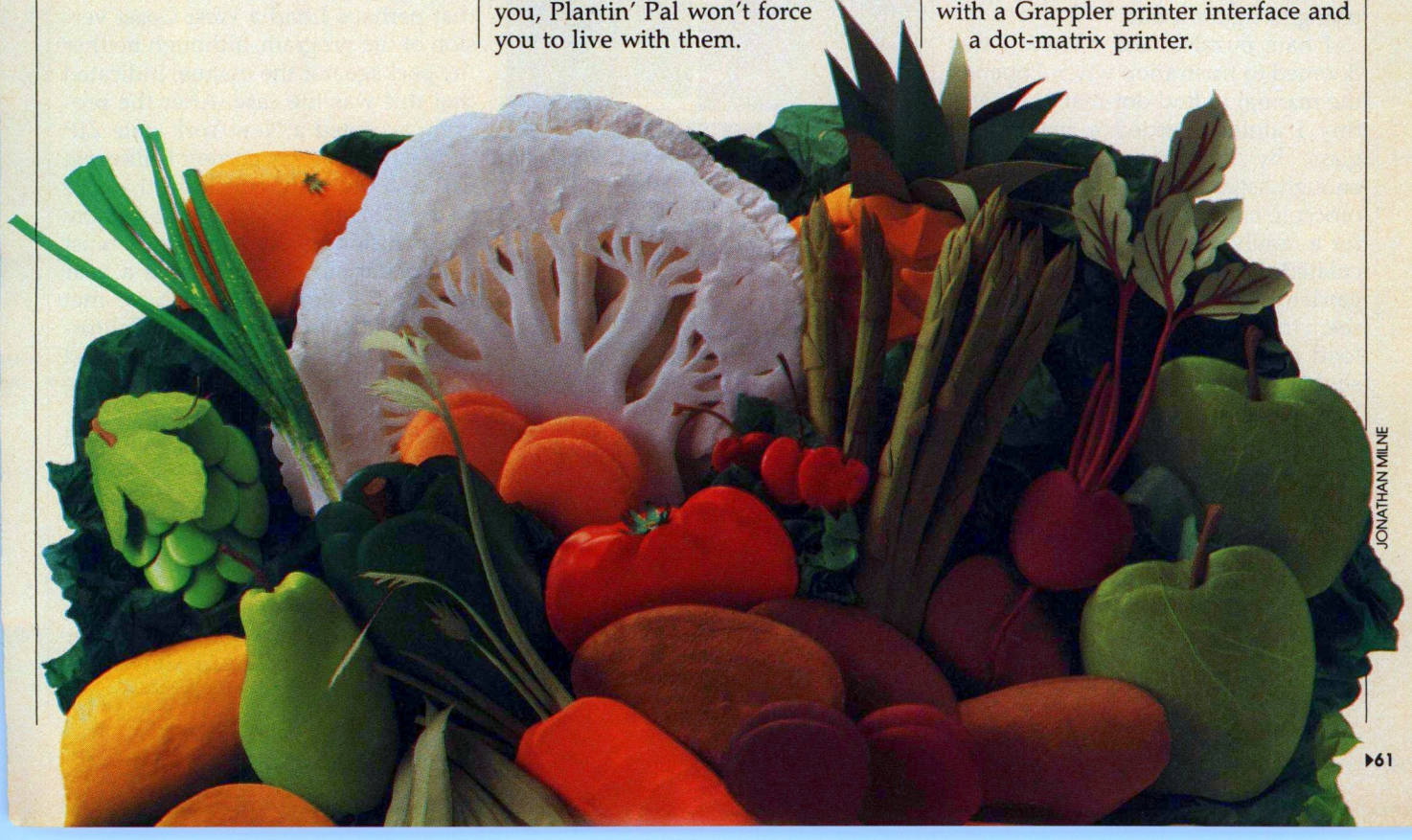
You begin your garden planning by setting the length and width of the garden and its north-south-east-west orientation. With Plantin' Pal, you can plan a garden as small as 6 × 3 feet or as large as 60 × 36 feet. A unique advantage of the program is that you can block out any unplantable areas within its boundaries (see figure 1). For example, a pile of large boulders lay almost in the middle of the garden I had in Maine. With Plantin' Pal, I blocked out a similar area on my diagram, and the program automatically planted around it. This feature also allows you to design irregular shapes for your garden, so if straight lines and right angles bore you, Plantin' Pal won't force you to live with them.

Once you've set up your parameters, Plantin' Pal gives you a choice of 40 vegetables. As you select each vegetable, the program gives you easy access to detailed tips for that vegetable, such as planting dates and average days to maturity, soil type and care, pests and diseases, and watering and fertilizing needs.

After you've chosen all the vegetables you want in your garden, Plantin' Pal automatically shows you where to plant them, row by row, in your garden plot. The program bases the amount of each vegetable it has you plant on your choice of these options: the number of people who will be eating the vegetable and whether you will be using it for fresh use only or fresh use and storage.

Two other beneficial options of the program are that it can calculate the order of the plant rows, based on north to south, according to height, so that tall vegetables such as corn won't shade short ones such as carrots. It can simultaneously calculate companion plantings.

If you prefer to do your own calculating, the program allows you to set the length of each row yourself. Plantin' Pal prompts you if you're about to run out of space in your plot before you finish planting all your selections, and it's easy to clear the screen and modify your choices to fit your garden space better. When you decide that your plan is satisfactory, you can print a picture of your garden layout with a Grappler printer interface and a dot-matrix printer.



JONATHAN MILNE

Plantin' Pal provides detailed planting instructions for each vegetable in your garden. When you press a key for the selected vegetable, you get the length of the wide row, the number of plants per row, plant spacing, and the planting pattern.

Finally, the program can calculate and print out a planting schedule for you, based on your region's frost dates. It gives you the earliest and latest range of planting dates for each vegetable in your garden. Although I live in California now and most of my gardening happens in pots on my deck, I based my Plantin' Pal garden plan on the state of Maine, where I used to have a large vegetable garden. As a test of the program's intelligence, I listed sweet potatoes on my list of chosen vegetables. After I had entered my region by typing the two-letter postal abbreviation for Maine, the program was quick to point out the error by displaying Sweet Potato Not Recommended in place of a planting schedule.

Puzzling Planting

Shannon Software's The Gardener's Assistant is also designed to help you plan and print out a diagram of your vegetable garden (see figure 2). If you're like me and prefer spending your time wading through the mud in the garden to wading through a complicated and difficult program and manual, however, you might want to pass on this one. On the other hand, if you like puzzles, you might enjoy trying to figure it out.

I hate puzzles, and I knew I was doomed to frustration when I opened the manual to find dot-matrix type so tiny I almost needed a magnifying glass. By the time I had planted enough asparagus, pole beans, beets, broccoli, brussel sprouts, and cabbage for a family of two, the program calculated that I had filled –11% of my garden. The program's calculations seem to be based on a year's supply of food per person. Since I haven't the slightest interest in canning and freezing vegetables and fresh use did not appear as an option, I was at a real disadvantage. When I went back to try to modify the vegetables in my garden plan for a better fit, I kept getting the message not in the garden. After an hour and 15 minutes, I was still trying to figure out how to make the program work for me, compared with the hour it took me to come up with a complete garden plan with Plantin' Pal.

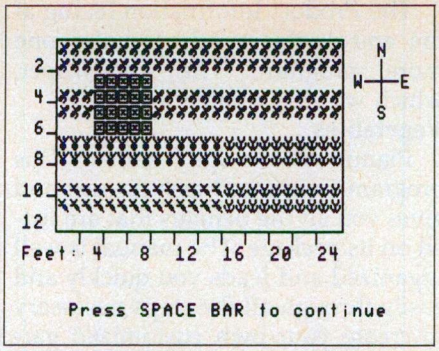


Figure 1: Plantin' Pal lets you block out any unplantable areas within your garden parameters. Pole and lima beans, beets, and carrots—each represented by its own symbol—are laid out in this garden plot around the rocky area in the upper left corner.

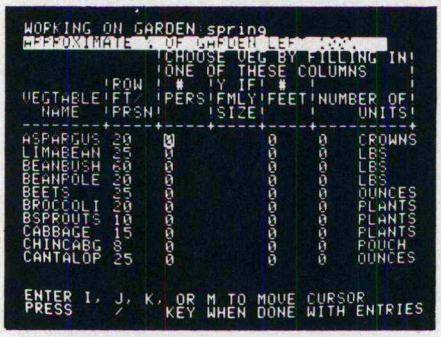


Figure 2: The Gardener's Assistant planting list lets you choose from 50 vegetables for planting.

Figure 3: Ortho's Personalized Plant Selector gives gardeners a comprehensive variety of plant characteristics from which to choose. Once you've filled in each category, the program lists all the plants that meet your criteria.

Figure 4: Once you've become expert at using Design Your Own Home Landscape, you can color-fill your drawings using a variety of patterns from the program's palette block.

Plant Database

If you've been looking for a complete plant encyclopedia on disk, your search is over. Ortho Information Services' Personalized Plant Selector contains detailed information on more than 700 different plants, from ground covers to trees, annuals, perennials, and vines.

I found the best use of the program was to have it help me define those plants that would be most suitable for a specific plan. For instance, I wanted a flowering plant next to my driveway. After choosing the menu option Make a PERSONALIZED PLANT LIST, I received the following specifications to fill in: plant type (I chose ground cover), height (six inches), flower color (lavender), blooming season (early summer), light requirements (half-day sun), water requirements (medium). The program came up with one plant that fit all of these specifications: epimedium grandiflorum. You don't have to fill in every requirement to get a personalized plant list, and, of course, the fewer requirements you fill in, the longer the list will be.

Like the vegetable-gardening programs, Ortho's program allows you to regionalize your choices by typing in your ZIP code. Here I ran into trouble. Again I decided to base my plant choices on the state of Maine. After entering several Maine ZIP codes and getting the same zip code not found message, I came to the conclusion that perhaps I had a West Coast version of the program, although neither the package nor the manual indicated that this was the case. After the program accepted a New York state ZIP code as well as my current California ZIP, I could only conclude that the state of Maine had to be too remote for inclusion in the program. I must admit that since I left Maine a year ago for the West Coast, I have met several people (all native Californians) who looked very puzzled when I told them I came from Maine (where's that?).

Ortho's plant selector can sort and list plants by botanical name, as well as by all the specifications I listed to find my ground cover (type, height, color, flowering season, light, and water requirements). Each specification category has several subheads, so it's easy to get specific lists for your planting needs. Figure 3 shows the kind of information available to you about each plant.

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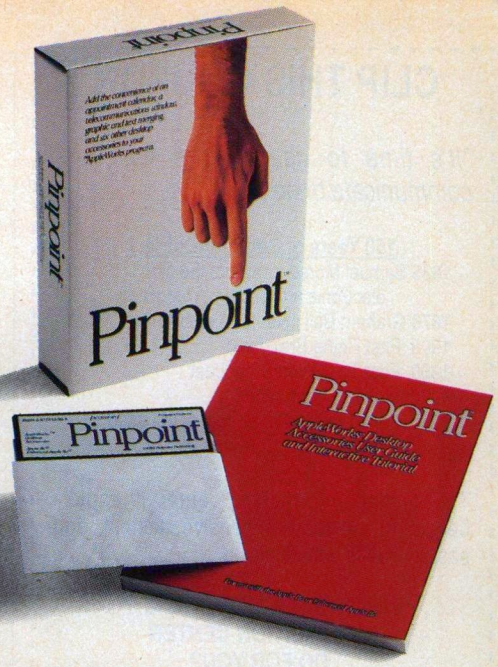

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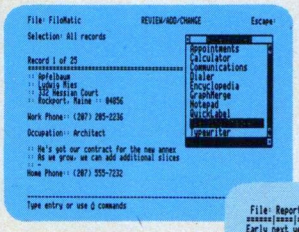

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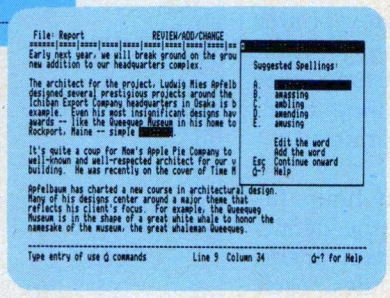

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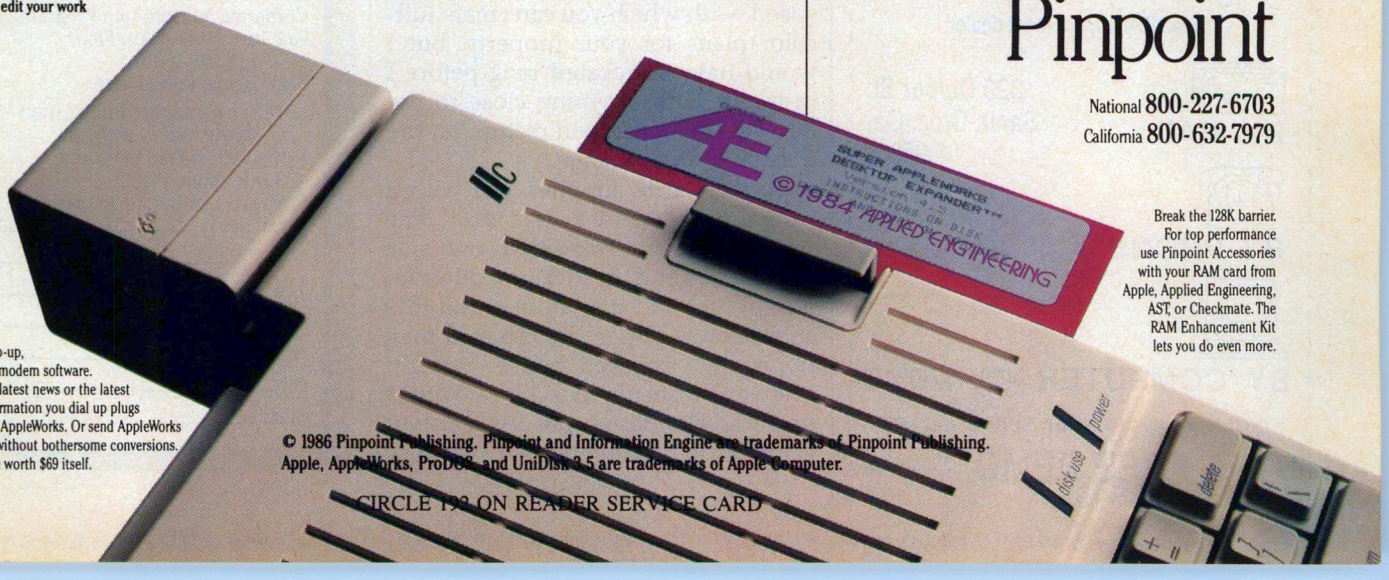

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Ortho's Personalized Plant Selector contains detailed information on more than 700 different plants.

Ortho's program includes three built-in utilities: a calendar and note pad for keeping garden records and reminders, and a calculator. You can print out the plant lists and descriptions according to your specifications. For example, you can print a list of all pink flowers that bloom in early summer or get a rundown of all vines that can survive dry conditions.

So if you sometimes feel overwhelmed by the vast choice of plant varieties for your garden and yard, Ortho's Personalized Plant Selector can help you make up your mind about what shrub to plant beside the patio.

Landscaping

Avant-Garde's Design Your Own Home Landscape Design is a multi-layered computer-aided-design program that takes you, step by step, through the complexities of landscape planning. The result is a full-color high-resolution plan or picture that you can print out if your printer has hi-res-output capability. If it doesn't, the program includes detailed instructions for creating a format that will give your printer that capability.

Plan on spending many hours familiarizing yourself with the details of the program. The main menu holds five program modules, each containing 3 to 12 submenus. The package advertises the 'breathtaking speed' with which you can create full-color plans for your property, but I would have suffocated long before I came up with anything close to the beautifully landscaped picture on the outside of the package.

Avant-Garde supplies you with a program disk and a data disk. The program disk is two-sided, one side for paddles and joystick, the other for a mouse. Avoid the paddles and joystick, unless you're the crooked man living in a crooked house. Straight lines are difficult to achieve with a joystick. The design process involves a lot of disk switching, so two disk

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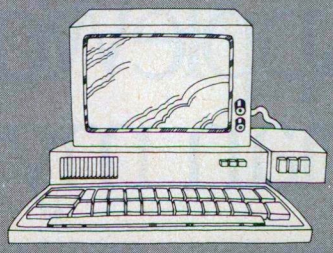

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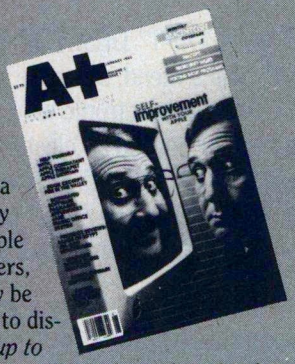

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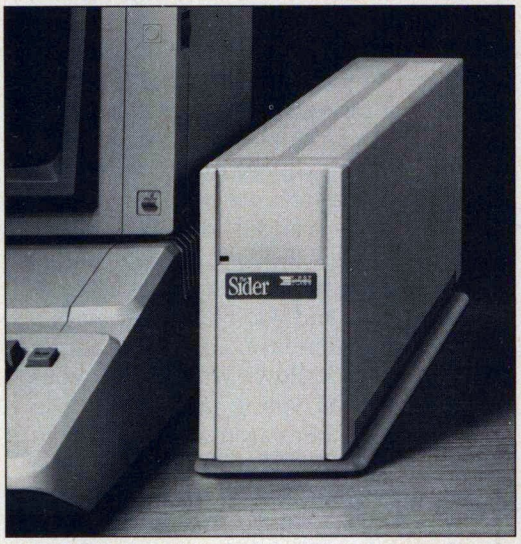

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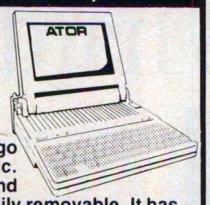

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drives are essential for efficiency.

Here's a basic idea of how the program works (an in-depth description would require an entire article of its own): You begin with a simple line drawing of your lot and house. As you move the cursor across the screen, making dots and joining them by clicking the mouse, the program automatically calculates distance in feet (up, down, and across the screen) and degrees of angles at the bottom of the screen (each dot equals one foot). So you end up with a top view of your property, drawn true to scale.

Now you're ready to begin planting. You can choose from close to 100 shrubs and trees for your landscape, as well as various details such as hedges, steps, walks, and stone paths. Each element is called up by a designated key, and you place them with a click of the mouse. Choosing a scale from 0 to 5 allows you to view your plantings as young or mature. You can move them around or pull them out altogether. The program lets you view your landscape from four sides (east, west, north, and south) and then color and label your completed plans (see figure 4).

Of course, it's difficult to say how close to the reality of your backyard a picture on a computer screen can come—probably as close as a professional designer's sketch comes, but there's the catch. It does take a professional to make a professional sketch, whether it's on paper or on a computer screen. If you're not a professional, this program won't turn you into one, but it will give you the tools to come up with a design that is far superior to drawing by hand or just imagining what your landscaping will look like. The key is time and patience. If you plan on including those two essential elements, you'll probably have a lot of fun with this program—and you may even end up with an impressive design. +

Avant-Garde's program takes you, step by step, through the complexities of landscape planning.

Susan Janus is a free-lance writer based in the San Francisco Bay Area.

PRODUCT INFORMATION

Plantin' Pal
Home & Hobby Software, Inc.
4936 Morgan Avenue South
Minneapolis, MN 55409
(612) 925-2591
List Price: $29.95
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The Gardener's Assistant
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Ortho Information Services
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CIRCLE 129 ON READER SERVICE CARD

BY DAVID D. THORNBURG

BASIC CONTROVERSY REVISITED

Response to February's column has been keeping the mailbox full.

Have you ever been in the dentist's office during an examination when the pick suddenly hit a sensitive spot? Occasionally we who express editorial opinions hit a sensitive nerve in our readers and, for some of you, that's what happened with my February "Learning Curve" column, "With Friends Like BASIC, Who Needs Enemies" (pages 79, 80). Because the mail has been so heavy on this topic (see the letters section in this and last month's issues), I have decided to respond to some of your comments in print this month.

Before I do that, I'd like to clarify a few background issues:

- My "attack" was on Applesoft BASIC, not on all BASICs, and especially not on the people who use it. I do not judge the quality of people by the language they use for programming.
- I am not an "academic" nor a "guru." I am a writer and software developer who puts his pants on one leg at a time and who is interested in accomplishing a task as easily as possible. Issues of "purity" and "elegance" are of major interest to me only when they influence the ease with which I can do my work.
- I have been creating programs in BASIC since the late 1960s. In the beginning, I didn't know that BASIC had problems—I just thought the creation of serious programs was *supposed* to be hard. Later on, as I encountered other languages, I realized that programming could be easier that I had thought.
- I still write an occasional BASIC program. My most recent Applesoft program was more than 20 pages long. Every single error in this program (there were quite a few) was a result of one of the "problems" I mentioned in my article—especially the lack of local variables.
- Contrary to what some of you may think, my parents were married when I was born.

My 'attack' was on Applesoft BASIC, not on all BASICs, and especially not on the people who use it.

The Function of a Language

A high-level programming language has two characteristics. It lets you write programs that other humans can read with ease, and it allows the unambiguous translation of these human-readable listings into a form that a computer can execute. Sometimes these dual goals are hard to achieve, and trade-offs are necessary. Every high-level language has its problems, but most languages handle these problems with more grace than Applesoft BASIC does.

A Variable by Any Other Name . . .

At least one reader took issue with my comment about two-character variable names in Applesoft, arguing that "two-letter names actually save time."

If you are writing short programs that no one else will read, this assertion may be valid. But if you read my original article again, you will see that my concern was not so much with Applesoft's two-character-name limitation. I am upset that Applesoft BASIC programmers can use longer names *in which only the first two letters are significant.* The variable names APPLE and APRICOT appear

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CIRCLE 137 ON READER SERVICE CARD

as separate words in the listing but are interpreted as the same variable when BASIC executes the program, which violates one of the requirements for a good programming language: the *unambiguous* translation of programs into a machine-usable form. To call this deficiency a "minor syntactical shortcoming" is like calling World War II a minor global disagreement.

What's in a Name?

Several readers took me to task because of my concern about the statement

```
A = A + 1
```

or, for those who like their BASIC pure,

```
LET A = A + 1
```

My argument was that the meaning of the equal sign in this statement is different from its meaning in the statement.

```
IF A = 6 THEN GOSUB 6000
```

In the first case, the equal sign means *replace;* in the second, it means *equals.* The Pascal solution (A := A +1) uses a special character combination (:=) to distinguish between these two meanings. Logo does even better by distinguishing between the name of a variable ("A) and its value (:A).

Those who object because these solutions require more typing shd B hpy 2 no tht thr R mny wys 2 smplfy Eng so it cn B ritn n shrt frm! As for me, I find that sloppy language often facilitates sloppy thinking—a tendency to which even the best of us sometimes succumb.

BASIC's Compactness

A good point one reader made is that, for short programs, BASIC allows more compact listings than Pascal does. For example, consider the following listings for a program that prints the numbers from 1 to 10.

BASIC

```
10 FOR X = 1 to 10
20 PRINT X
30 NEXT X
```

Pascal

```
PROGRAM ONETEN;
VAR X : INTEGER;
BEGIN
  FOR X := 1 TO 10 DO
    BEGIN
      WRITELN(X)
    END;
END.
```

The reader found that the BASIC version of the program took 35 seconds to write, run, and save. The Pascal version, on the other hand, took 2 minutes and 20 seconds and required a two-drive computer to eliminate disk swapping. This is a good point, to which I would like to add another piece of data. It took me only 7 seconds to write the numbers from 1 to 10 on a sheet of paper, thus beating the BASIC program by a factor of 5!

One of the most interesting arguments I received from readers dealt with the issue of 'structure' in programming.

If anyone wants to perform a real-time test, I suggest putting two competent programmers side by side, one with Applesoft BASIC and the other with Pascal (or Forth or C) and have them develop a fully debugged interactive video game from scratch.

By the way, I am not a strong proponent of Pascal. In fact, I find some of it to be as silly as Applesoft BASIC, but it is a bit higher on the ladder.

The Function of Structure

One of the most interesting arguments I received from readers dealt with the issue of "structure" in programming. One reader suggested that BASIC's "very lack of structure, which the sophisticates find so lamentable, is what makes it appealing to the beginner." This reasoning reminds me of Robert Frost's comment that "Writing blank verse is like playing tennis without a net." Another reader suggested that modular programming "[broke] the flow of ideas in the programmer."

Let's explore this comment for a moment. The function of a program listing is to give instructions to the computer. The function of program structure is (mostly) to create a one-to-one correspondence between the various parts of the program execution and the various parts of the program listing, which is important if you are writing a program that may have a bug in it. For example, if the program puts a square on the wrong part of the screen, it is much easier to find the error when the program is an

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assembly of compact, independent building blocks.

The argument for local variables connects to that for structure, and I maintain that a programmer should be able to limit the scope of changes in a variable's value.

Structured programming is not a new concept. In fact, this strategy applies to problem solving in general. If you're interested in the general application of this technique, take a look at the classic book "How to Solve It" by the late Dr. George Polya.

I have been accused of advocating "censorship" of the BASIC language. Nothing could be further from the truth. In fact, it is the censorship of other, more carefully crafted, languages that I am fighting. My interest is in promoting freedom of choice.

If each of you, as informed computer users, chooses Applesoft BASIC out of the languages available, that is fine with me. My concern is about schoolchildren and their teachers who are denied access to other languages or to information that would let them make informed choices about languages for computing.

Those who still think BASIC is free should know that this idea comes as a surprise to Apple Computer and Microsoft. BASIC isn't free; you had your freedom of choice denied to you when you bought your computer!

A Happy Note

In the six years I have been expressing my opinions in print, I have written a few columns that sparked lively debate among my readers. I think such an exchange of views is wonderful. The time and thought you put into your letters gave you the opportunity to crystallize your beliefs about the appropriateness and value of Applesoft BASIC. I commend you for your effort, and I respect your opinions.

I welcome a free and open exchange with my readers. For, whether you support or disagree with my position, you are using your mind for one task we are never likely to see a computer perform—free and independent thought. +

David Thornburg is the author of 12 books on computing and a regular contributor to this magazine. He is also the designer of Calliope, an information processor for the Apple IIe, IIc, and Macintosh computers. Dr. Thornburg enjoys hearing from readers and can be reached in care of this magazine.

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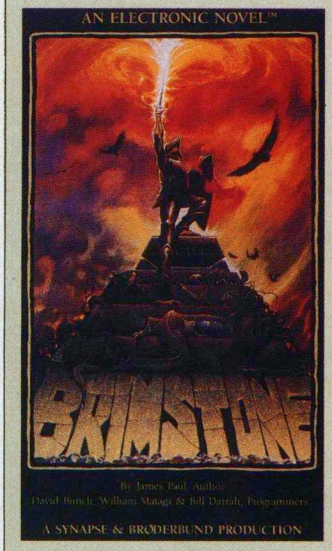

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GRID WARS
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A VIEW TO A KILL

SIR GAWAIN IN THE UNDERWORLD

"Forsooth," Sir Gawain the Bold shouted, "I've been bewitched!" Clad in but a nightshirt, the knight of the Round Table stood before the gates of an imposing castle. "This is not Camelot! Merlin, you misbegotten magician! All Hallows' Eve or not, if this is another one of your tricks . . ."

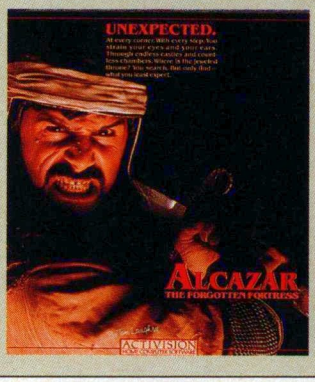
Alas, Merlin has nothing to do with Sir Gawain's predicament, for Sir Gawain is trapped within his own dream. He must journey into the very heart of the Underworld of Ulro and collect the words of a phrase that will set him free of his spellbound travels. If he fails, he forfeits his soul.

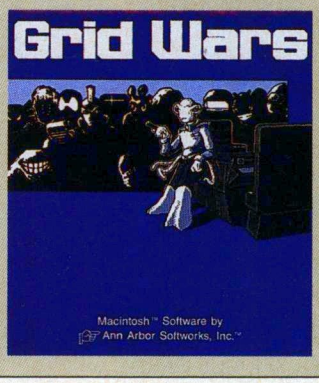
Brimstone, the third in a series of text-only "electronic novel" adventure games from Synapse/Brøderbund, places you in the boots of Sir Gawain the Bold. It seems inspired by that classic journey through hell, Dante's *Inferno*. To call it an adaptation is to sell it short, though. Brimstone is a riveting tale in its own right.

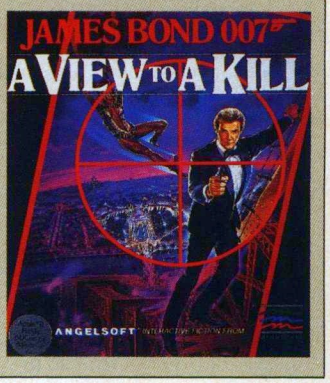
The crisp, descriptive prose pulls you into the game and propels you through the adventure. Each twist of the plot provides new challenges—good old-fashioned puzzles, the thrill of exploring, and the uncertainty of whether you should have taken a different path. Meanwhile, the literary tapestry that creates the Underworld tugs at your imagination.

Most adventure games let you plug in the disk and start. Not so Brimstone. Like Mindwheel and Essex (the first two electronic novels in the series), Brimstone requires you to read several short chapters in a hardbound book. Helpful clues are buried in and among the cast of characters, several ridiculous tales, and a score of nearly blank pages.

The parser structure, which recognizes more than 1200 words, does a commendable job of translating your intentions into actions. On occasion, the response to your command has nothing to do with the situation you are in. Farsighted adventurers will take inadvertent information, say "Aha!" and squirrel that tidbit away for future reference.







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Overall, Brimstone has a nice pace. You feel you are really moving along and accomplishing something—even though you may fall for one ploy or another (like the old fake Guinevere trick). Indeed,

Brimstone's literary tapestry tugs at your imagination.

Brimstone might be faulted for being a bit too easy. While I was stuck in the ice, the program told me exactly how to become mobile again. Still, most solutions call for some head scratching and definitely some spitting.

All in all, Brimstone is a fascinating and entertaining adventure game. It catches your interest from the start and fuels it with heart-stopping prose, brain-wracking puzzles, and soul-wrenching decisions. Brimstone will fire you up and not let you down for a long time.

Russ Lockwood

Brimstone
Synapse/Brøderbund
17 Paul Drive
San Rafael, CA 94903
(415) 479-1120
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The ancient Moorish castle Alcazar beckons. As an intrepid explorer, you are compelled to make your way across the treacherous countryside to this mythical stronghold of wealth and grandeur. Guided only by a map and your wits, you must pass through several smaller castles dotting the landscape. You have to avoid numerous demons and traps while gathering items of value to your quest. When you think you are ready, you enter Alcazar.

Alcazar: The Forgotten Fortress is a new arcade-style game from Activision reminiscent of the games Activision created for the Atari VCS game machine. It opens up with a map display while an Arabic-sounding theme song plays. You then use the joystick to move along black pathways until you come to one of the 19 castles.

When you enter a castle, the scene shifts to an overhead view of a three-dimensional room. You now see yourself, the intrepid explorer; the brick walls of the castle festooned with burning torches; and various doors.

Each castle harbors a variety of enemies, and you can kill them in numerous ways. An attentive explorer can obtain many helpful clues. For instance, the castles come in four colors, and each kind of castle contains specific objects and specific enemies—a blue castle always contains rope and guns as well as tigers, grif-

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An Apple IIc

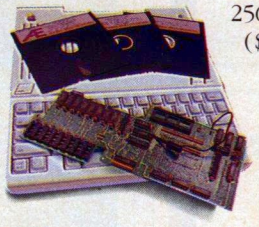
An Apple IIc with Z-RAM

The Apple IIc on the right works exactly the same as the Apple IIc on the left. Almost. The Apple on the right has a powerful memory expansion coprocessing card called Z-RAM. From Applied Engineering. Which means the Apple on the right can completely load AppleWorks into RAM—and then run it up to thirty times faster than the Apple on the left.

Z-RAM also acts as a solid-state disk drive. Which means the Apple on the right will load and store programs up to 30 times faster. And, our included RAM disk is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

Turbo Charged AppleWorks.

Even a 256K Z-RAM can completely load AppleWorks into RAM. With Z-RAM, the moment your fingers touch the keyboard AppleWorks responds. A 256K Z-RAM lets your IIc run AppleWorks up to 30 times faster, increases available desktop to 235K and maximum number of records from 1,350 to over 15,000, quadruples the number of lines allowed in the word processor, provides a print spooler, and auto-segments large files so they can be saved on two or more disks. A 512K Z-RAM boosts AppleWorks desktop to an incredible 425K.



Take a closer look.

There's more. Z-RAM has a built-in high speed Z-80B microprocessor that allows you to run CP/M programs. Which means you now have access to the single largest body of software in existence, including popular packages like WordStar, dBase II, Turbo PASCAL and Microsoft BASIC. A 16 bit option is also available.

And still more. Z-RAM is compatible with all IIc software and hardware, installs easily in just ten minutes with a screwdriver (slightly longer without), is available with 256K or 512K of additional memory (a 256K Z-RAM can be upgraded to 512K at any time). Z-RAM is easily handled by the IIc power supply with our patent pending power saving design.

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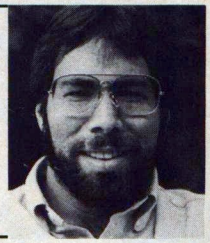
> ***"I recommend Applied Engineering products whole-heartedly." (Of course, Steve's IIc has a Z-RAM installed.)***
>
> *Steve Wozniak, the creator of Apple Computer*



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Z-RAM comes complete with simple instructions, RAM disk software, Z-80 operating system, CP/M manual. And a five year "hassle free" warranty. Make a good Apple great. With 256K Z-RAM "384K total" ($329); with 512K "640K total" ($389); 16 bit option may be added later ($89).

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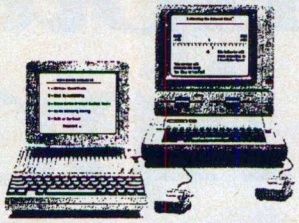

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An attentive explorer can obtain many helpful clues.

fins, tarantulas, and flies, for example. Some of the dangerous creatures leave a spoor, such as the paw prints that tell you that a tiger can't be far away. Other enemies make sounds when they're near.

Flying carpets are available to whisk you instantly to another part of the current castle, and bottomless pits are ready to swallow any careless explorer who doesn't look where he's going. You can use bottomless pits to dispatch several of your enemies, however, if you're careful.

Each castle has two stories, except for Alcazar which has three. As you explore each floor of a castle, you create a crude map that appears at the bottom of the screen. In addition to the map, you see what you are currently holding in your hand and the contents of your pockets. You can carry four items, and you must shift them (with the joystick button) from pocket to hand in order to use any of them.

In Alcazar, you find an explorer like yourself being held captive. Free him for an extra life. Then you find the throne room to complete the quest.

On the surface, Alcazar: The Forgotten Fortress doesn't look too impressive—its similarity to older-style video games dates it a little—but playing the game is fun, and a pleasant diversion. Although the game is easy to master in the first level, the three subsequent levels, each with its own characteristics, are more difficult to play.

You'll find many complex and involving games on today's market, but they take a lot of time and concentration to play. Alcazar: The Forgotten Fortress is one of those games you can play more casually and quickly. But beware of the Genies. They're really tough!

Rusel DeMaria

Alcazar: The Forgotten Fortress
Activision, Inc.
2350 Bayshore Frontage Road
Mountain View, CA 94043
(415) 960-0410
List Price: $39.95
Requires: Apple IIe or IIc, 48K RAM

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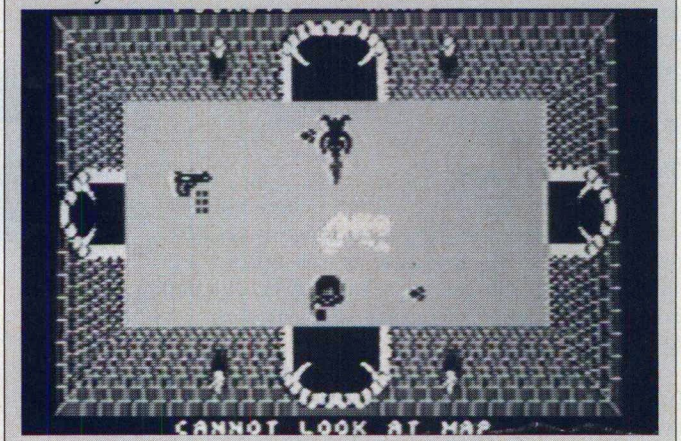

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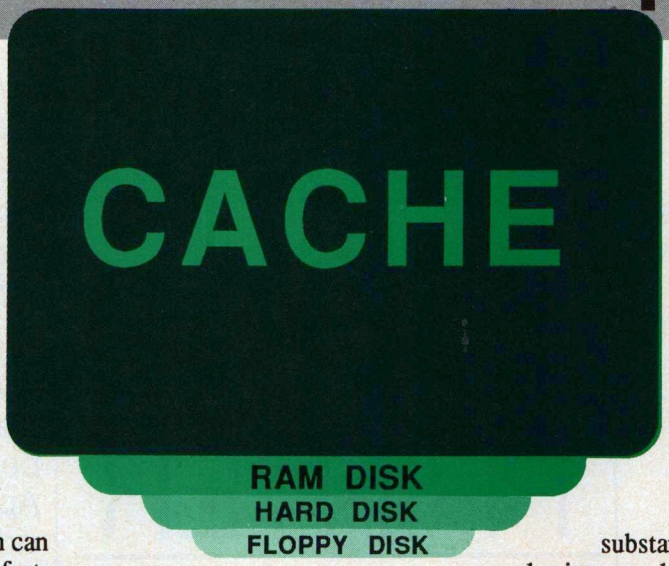

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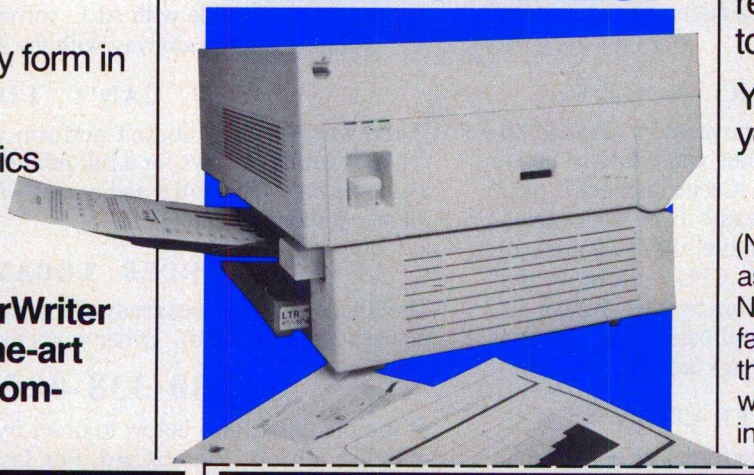

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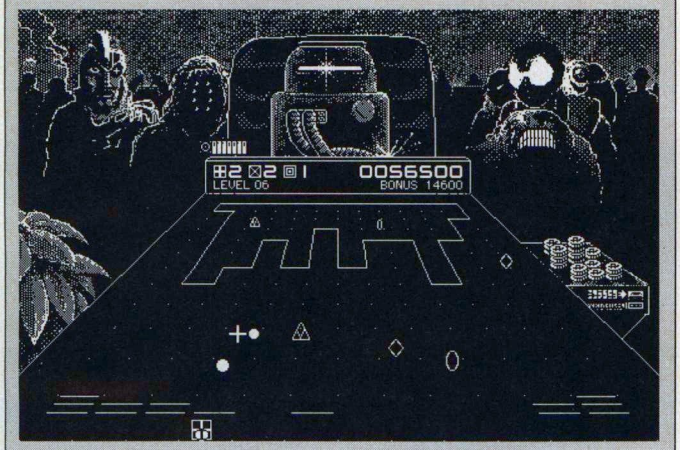


IT'S WIN OR GO DRY AT ALPHIE'S!

"OK, Alphie, I came here to relax. First you tell me I can't smoke because there's a methane breather present. I'll accept that. I'll even put up with this rowdy bunch of intergalactic misfits that frequent your place. But you mean to say I can't have a drink unless I beat some of these misbegotten sons of wayward satellites at some game called Grid Wars?"

A nod from his four-horned head, a little twisted smile on his lips, and a slight gleam in his eye was all the reply I got.

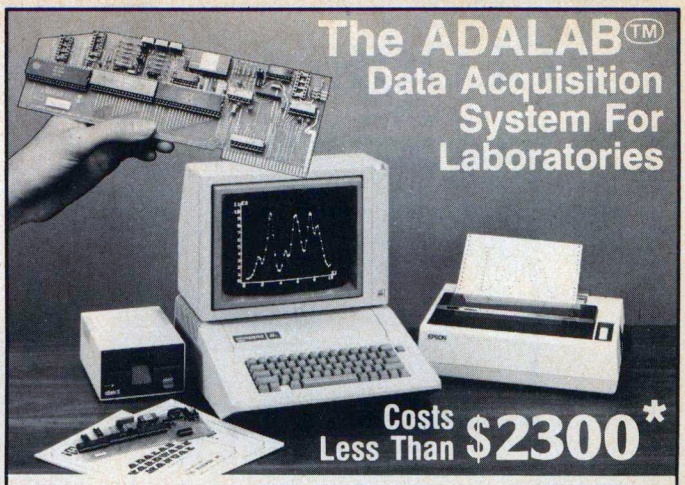
OK, where's the battlefield?

And thus began my fascination with yet another shoot-'em-up, Grid Wars, a game that makes the most out of the Mac's graphics and sounds, programmed and drawn with a sense of humor as well as a sense of challenge. (Thanks to Roy Harvey for the programming and Fred Zinn for the fascinating illustrations.) Although it's a shoot-'em-up, it's also pretty humane because you don't wipe out anything except geometric shapes.

So back to this seedy dive of Alphie's, the only tavern for 500 parsecs, with my companions, a collection of some of the weirdest creatures this galaxy (or any) has to offer. I take a seat at one end of a table, and before me is this electronic representation of a grid. (You see, in this computer game you play a computer game—sort of a mirror in a mirror in a mirror. . .)

Looks easy enough. My opponent sits at the other end of the table, and his companions are lined up, gleefully awaiting their turn at me. They all bear a slight resemblance to the crew that inhabited the bar in *Star Wars*. I feel a little like Ivanhoe at that joust where he was supposed to take on one bad guy after another. No sweat. I have a protective wall in front of me that is three "bricks" deep. My opponent is slinging these little spinning circles, squares, and diamonds at me, and for the most part they seem to follow the grid. I have unlimited shots from a "laser" cannon to try to wipe them out.

I put *laser* in quotation marks because I think of lasers as shooting knife-like beams of light in



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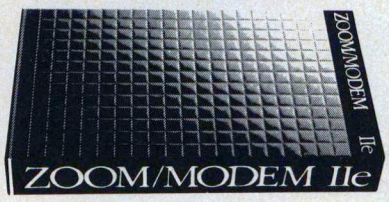

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MS - 1000-A

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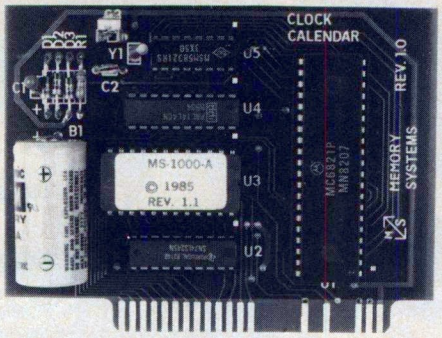

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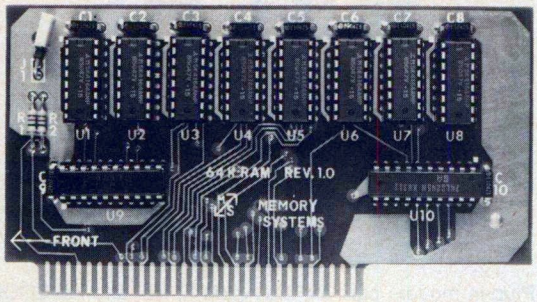

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That's Entertainment

straight lines. This thing is more like a mortar, lobbing objects that look like ping-pong balls. Still, I got the hang of it pretty fast. Knock out the little circles and things. Every time they hit your protective wall, they knock out some of your protection. Once the protection's gone, you've got to worry about knocking out the circles while avoiding getting squashed. If you do get squashed, you look like a firecracker that's fizzled. A few spurts of light and you're vaporized. Not to worry—one life gone, two to go.

Alphie's is really a neat little bar near galaxy's end.

Oh yes, you have another fear. As the circles spin at you, the grid is slowly being overtaken by advancing columns of squares. You can beat these back with the cannon, but count that tactic as a last resort. You see, a clock is ticking all the time and you can not only hear it, but you can also see that with each tick you lose 100 bonus points. Time spent beating back the grid, therefore, is wasted, unless, of course, a column makes it to your side, which is certain death. The strategy, then, is to concentrate on the faster-moving objects that attack regularly. Wipe all these out before the columns advance, and you win.

You also get two torpedoes (they'll knock out an entire column with one shot) and one vaporizer, which will eliminate all attacking pieces with one shot. I found that by the time I had to resort to these devices, the game was nearly lost.

A few words on advanced tactics: Watch for patterns in the movement of the pyramids and linked circles. Hoard your torpedoes and vaporizers until you really need them. Of course, don't overdo this conservatism. Nothing is more frustrating than getting wiped out while carefully husbanding three torpedoes and two vaporizers!

So what happens if you wipe out all the attacking shapes? Small potatoes. The guy you were playing was three sheets to the wind. Wait until you see your next opponent. He (she? it?) has a new bag of tricks. Circles and squares are joined by pyramids, which split into two rectangles each, and after that—well you try it. The clientele is a little eclectic, but Alphie's is really a neat little bar near galaxy's end. Just head out toward the Orion Nebulae and take a left.

Arrive with a sharp eye and ready wit. Winning, you'll find, has its own rewards. Say hello to Alphie for me. And see if you can get my mouse back, will you? Last I saw, it was dangling over the edge of his trash can.

Greg Stone

Grid Wars
Ann Arbor Softworks, Inc.
308½ South State Street
Ann Arbor, MI 48104
(313) 996-3838
List Price: $39.95
Requires: Macintosh
CIRCLE READER SERVICE NO. **402**

CIRCLE 103 ON READER SERVICE CARD

MONEY FOR YOUR GOLDEN YEARS

Is your nest egg the spare change in your junk drawer, an old passbook savings account, or a diversified portfolio? No matter which, if you want it to increase in value, you're going to have to take control. Run your money; don't let your money run you.

Most of you probably don't even balance your checkbook or know how to reconcile it. How, then, can you be expected to take charge of your financial future when you don't understand the "ropes?" According to Blue Chip Software, playing its financial-planning simulation (a sophisticated word for *game*) Squire will help teach you how.

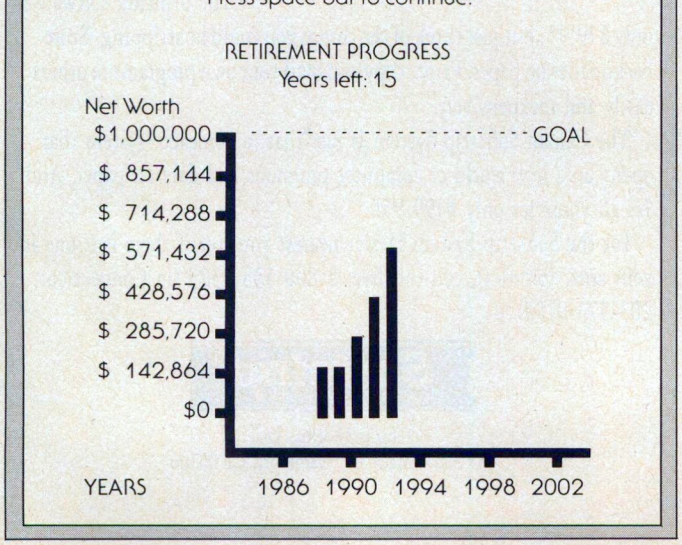
Squire is not for kids—unless, of course, they subscribe to the *Wall Street Journal*, as well as the *New York Times*. If they (or you) don't, then start by reading the introduction to financial planning included in Squire's documentation. The entire spectrum of investments, as well as tax shelters, is briefly touched on. Reading the primer won't guarantee that you'll pass a Certified Financial Planner exam, but it will give you a notion of what's in store for you.

Squire assumes that you want to retire as a millionaire (a common theme among Blue Chip games), but then again, who doesn't? Only someone who is a multimillionaire.

Squire provides stimulation, insight, and frustration.

Squire gives you 20 years to amass your fortune. If you want more (or less), Squire allows you to play under those rules also. Either way, your goal is to accumulate money for your "golden years."

As realistic as Squire wants to be, it has to make some assumptions about the "real world." Inflation is 8%, short-term gains and losses are taxed at



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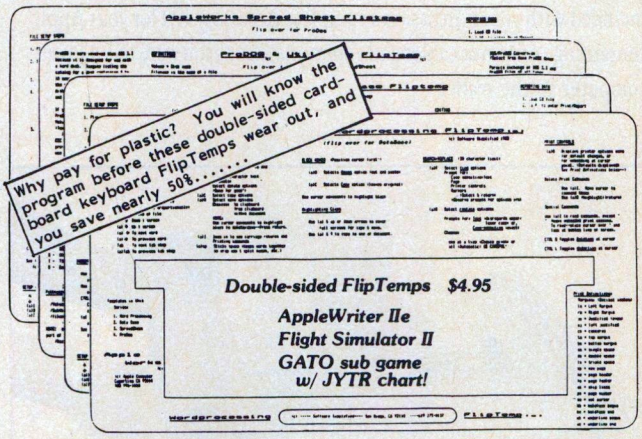

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It's part of our expanding StripWare™ Library containing programs, data, art, spreadsheet macros and templates. The Library features a variety of software applications and you'll find new material appearing each month in such leading computer magazines as A+, Call A.P.P.L.E., inCider, Nibble, and // Computing.

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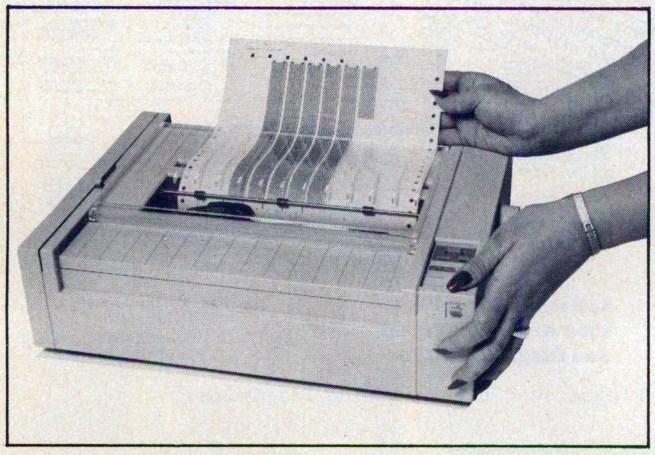

In addition, you'll find a StripWare Sampler with 50 programs from a line-up of popular authors and publishers that includes Addison-Wesley, David Ahl, Family Computing, Tim Hartnell, Hayden Books, Nibble/MicroSPARC, Osborne/McGraw-Hill, The Waite Group, and John Wiley & Sons.

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CIRCLE 120 ON READER SERVICE CARD

TRAVEL WITH HALLEY'S COMET

For centuries, man has been fascinated with the heavens. In this year of the return of Halley's Comet, there is renewed interest in the stars. How much do you really know about Comet Halley? Where should you look to spot the Comet? What constellations will it pass through, and when?

You can find the answers to these questions and more on the two data strips on the near right. They contain the program **STARWATCH,** which appeared in a special issue of UPTIME . . . the magazine on a disk.

Read in the data strips and RUN the program. You're presented with three choices: PLOT THE STARS shows you the constellations in Halley's path. STAR QUIZ will test your knowledge of the heavens Halley passes through. Finally, PLOT HALLEY'S PATH shows you Halley's trip through the constellations.

MAKE YOUR OWN IMPRESSIVE POSTERS

Having a party? Want to say something in a big way? Are you going to a game and want to give your favorite player a boost? Maybe you've finally built up enough nerve to ask Sally to marry you, and you want to put a banner near the highway for everyone to see.

Read in the two data strips on the far right and type in RUN **POSTER.PRINTER.** This program, by Jeffrey Mills and John Fedak originally appeared in hotCider, is menu-driven. It does not print lowercase letters. Experiment with your printer and produce customized posters that express thoughts or ideas in your own personal style.

Poster Printer will provide you with hours of fun. Be careful though, always keep some extra paper near by. You see, **POSTER PRINTER** can be addictive.

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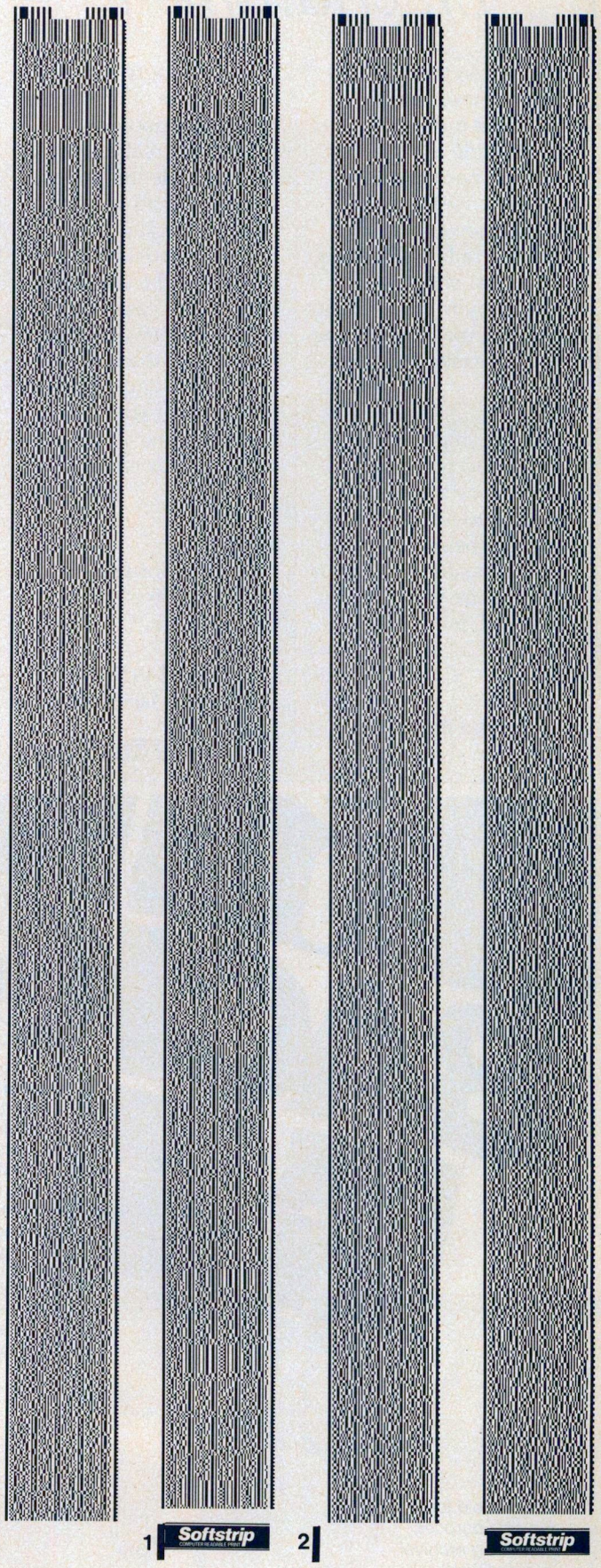
StripWare Library Nos. 207-208



That's Entertainment

30%, and so on. The net effect of these assumptions is not unrealistic, and they provide a game that is not too hard to learn.

To gain wealth, you read the news, play the markets, trade collectibles, and do just about anything that you would do in reality. To make analyzing numbers easier, Squire provides you with several graphs.

As you might expect, you have to play parts of the game by somebody else's rules—that somebody else being Uncle Sam. If you don't pay your taxes, Squire won't throw you in jail, but it does ensure that Uncle Sam gets his due.

Squire is a perfect capping for the Blue Chip simulation series. Although it doesn't have the depth of the other simulations (commodities, stocks, and real estate), it does provide the perfect blending of all of them into one package.

Squire provides stimulation, insight, and frustration. It isn't easier to make or lose money in Squire than it is in the real world. The comforting difference is that when you lose "Squire dollars," you can still pay your rent and eat.

Ken Landis

Squire
Blue Chip Software
6744 Eton Avenue
Canoga Park, CA 91303
(818) 346-0730
List Price: $49.95
Requires: Macintosh, 512K RAM
CIRCLE READER SERVICE NO. **403**

AGENT 007 FACES PARSER PERILS

007. Those three numbers stand for danger; excitement; exotic locales; fast cars; fast women; a license to kill; and, of course, Bond. James Bond.

A generation of moviegoers have thrilled to the exploits of Mr. Bond. The debate over whether Roger Moore or Sean Connery (ignoring for the moment George Lazenby and not even considering Peter Sellers) is the real 007 is not important anymore, for with the release of A View to a Kill by Mindscape, the real 007 is you.

A View to a Kill is a text-only adventure game based on the latest James Bond movie. It places you in the shoes of 007 and gives you the opportunity to save the silicon world or cause the British government great embarrassment. As Bond does in the movie, you start on the snowbound tundra in Siberia, frantically searching for agent 003 while Soviet

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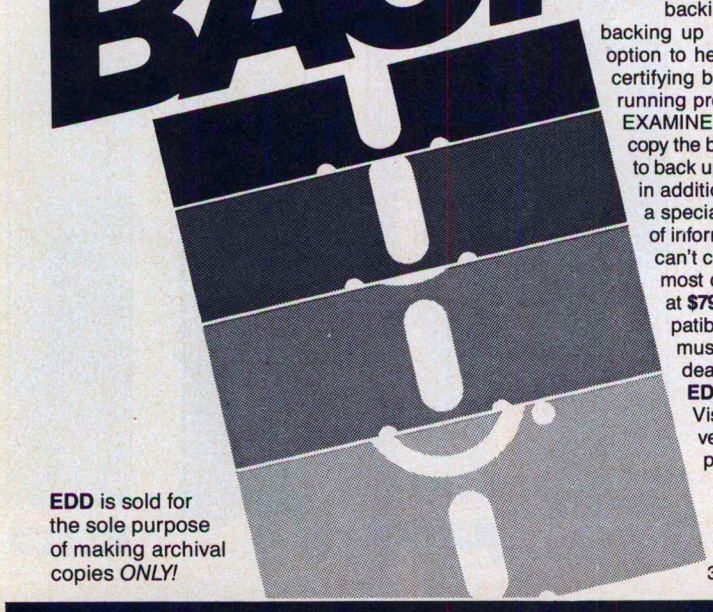

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ESSENTIAL DATA DUPLICATOR 4

CIRCLE 190 ON READER SERVICE CARD

With the release of A View to a Kill, the real 007 is you.

troops search for you.

Those of you who have seen the movie but have forgotten all the fine details will soon start remembering the plot. To call A View to a Kill, the game, an exact duplicate of *A View to a Kill*, the movie, is an injustice, though. It certainly uses the same names and locations and includes the high points of the action, but every once in a while you get thrown a curve.

Those who have read the novels that preceded the movies will not appreciate the game's terse descriptions of surroundings and people. The memory of the movie, rather than the prose, involves you in the situation. Indeed, the descriptions are rather bland compared with those of Infocom, Trillium, and Synapse/Brøderbund games.

Likewise, the parser structure is not up to the standards the aforementioned companies have set. It does not seem to recognize the word *and*—for example, Take the wires and the calculator nets you only the wires.

Sometimes the game does not acknowledge objects in the same location. I drove a car, a 635cs, to the Eiffel Tower and parked next to another car, a BMW 325. I even left the door to the 635cs open. When I returned, I could not get back into the 635cs. The game kept telling me, The 325's door is locked. I do not want the 325. Ah, so maybe the 635cs was stolen or towed.

You start on the snowbound tundra in Siberia.

A quick look reveals that the 635cs and the 325 are here. Typing Get in 635cs nets me a you can't get there from here.

My enthusiasm for the adventure falters with each failure to translate my intentions into game actions. Instead of moving at a swift pace worthy of a Bond movie, you proceed in short spurts with long waiting periods in between.

007 fanatics are undoubtedly going to buy this adventure. For those who appreciate the 007 movies but want more in a game than a name, however, A View to a Kill proves disappointing.

Russ Lockwood

A View to a Kill
Mindscape
3444 Dundee Road
Northbrook, IL 60062
(800) 221-9884
In IL (800) 942-7315
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM; one disk drive—or Macintosh

CIRCLE READER SERVICE NO. **404**

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†Note: CP/M, Pascal and PFS: WRITE-DOS versions do not suggest correct spelling of words or allow immediate correction of misspellings.

Sensible Grammar™ is available for $99.95; **Sensible Speller™** for $125.00 in either the "IV" or ProDOS version; **Sensible Technical Dictionary™** for $59.95; **Stedman's Medical Dictionary™** for $99.95; and **Black's Law Dictionary™** for $99.95. The three specialized dictionaries require the **Sensible Speller.** All programs are available separately and run on Apple® computers.

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Beagle Bros Apple® Software Report

Ad Number 251 — *"All the News That Fits"* — *Spring 1986*

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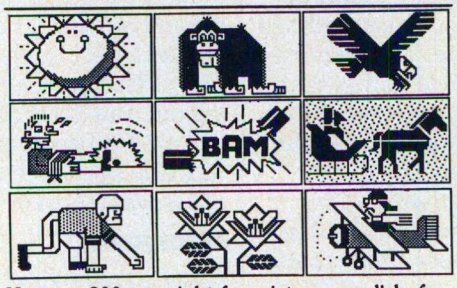

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Use Minipix pictures straight from the Minipix disk on your greeting cards, banners and signs. And now you can convert part of *any* normal hi-res picture into Print Shop format! And use Minipix's picture editor to create special graphics effects like instant mirror images, negatives, distortions and blowups:

MousePainters can load Minipix directly from the disk. *Alpha Plotters* can "clip" Minipix off the screen and "paste" them onto their own pictures. *Shape Mechanic* and *Apple Mechanic* fans can use Minipix in shape table format.

$29.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple II Minipix pictures by Fred and Sara Crone*

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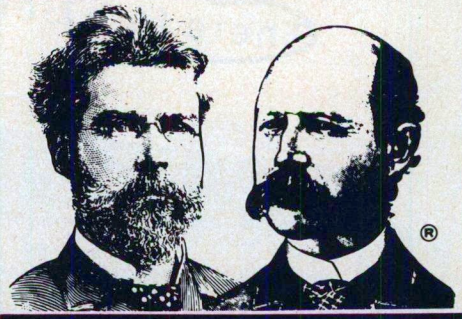

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Double-high resolution plus 16 hi-res colors!

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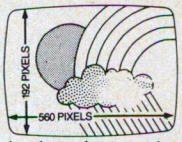

Beagle Graphics lets you use your 128K Apple to draw and label impressive double hi-res images (up to 560 pixels horizontally) using the Apple keyboard or, optionally, a joystick, AppleMouse, Koala Pad or Graphics Tablet.

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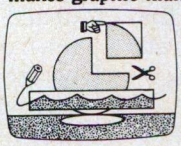

picture section may be individually altered or relocated to a new position on the screen. Or onto a completely different picture!

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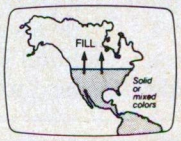

double hi-res, save and load any image section, compress picture data to 1/3 disk space, produce double hi-res "slide shows" and more.

READ THE REVIEWS: *Family Computing,* Feb. 86, gives its highest rating (★★★★) to Beagle Graphics in $-Value, Graphics Quality, Documentation and Overall Performance.

$59.95 *Unprotected, ProDOS and DOS 3.3 Compatible with any Apple IIc or 128K IIe Written by Mark Simonsen*

```
]LIST
10 HGR2: CLEAR: ONERR GOTO 10
20 P=1+(P=1): POKE 49238-P,Z
30 POKE 230,32+P: POKE 28,C
40 CALL-3082: POKE 49235+P,Z
50 C=C+1: GOTO 20
```

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CIRCLE 147 ON READER SERVICE CARD

BY MICHAEL WIESENBERG

FIGURING THE ODDS OF MATCHING THE CARDS

Who has the best of it?

"May birthdays at 3 o'clock." Aileen Risingsign, departmental secretary to the manager of the languages lab at I-Q Industries in the heart of Silicon Valley passes through the maze of cubicles, reminding programmers, writers, and marketing engineers of the afternoon's ritual.

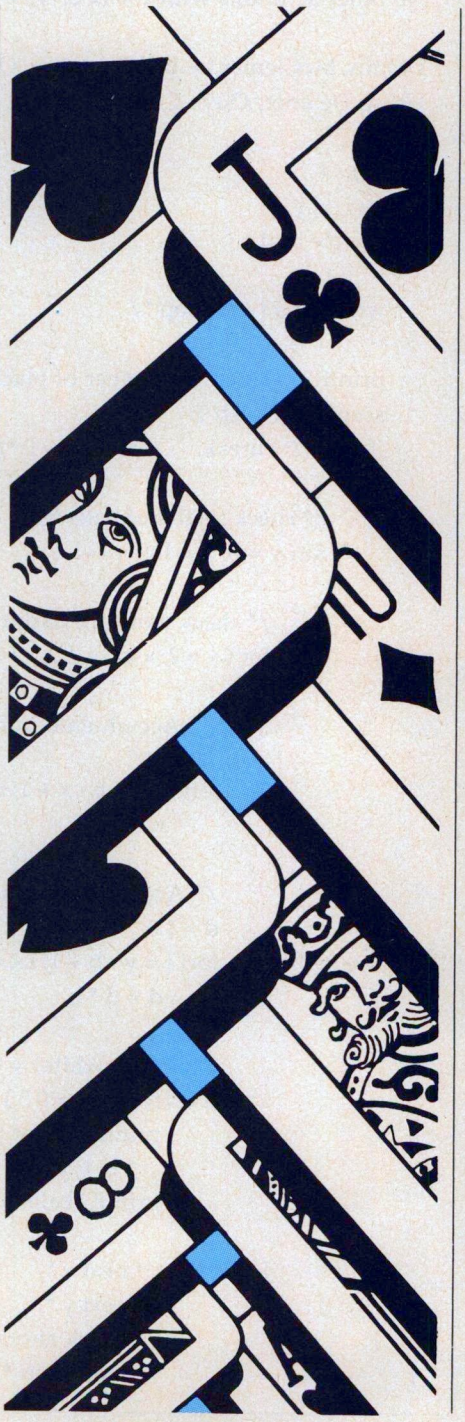
Grey Scrivener, technical writing specialist, pauses between keystrokes at his terminal. "Do we have to admit how old we are?"

Spotswood Gilbert, R&D engineer, is a week younger than Scrivener. "It's your birthday, too, isn't it, Pops? Looks like we miss Junk Food Run today."

At 3, the group gathers in the aisle adjacent to lab manager Jack Auctor's cubicle. Once a month, the birthdays for that month are jointly celebrated with a cake purchased at a nearby bakery and paid for from petty cash. Auctor, a firm advocate of I-Q's policy of management by mingling, encourages these get-togethers as an informal method of interdepartmental cross-fertilization. He is the sort of person who claps his hands once loudly to get the attention of the group, or perhaps he does it in gleeful anticipation of the celebration.

"We have three birthdays this month: Grey Scrivener, the author of the series of generic FORTRAN manuals; Spotswood Gilbert, who has written much of the code that lets the FORTRAN compiler run; and Bob Levin, the programmer responsible for most of the interfacing between the compiler and the real world."

Risingsign cuts the chocolate raspberry sheet cake with white frosting blue-lettered with the names of the birthday children, passing pieces around.



MICHAEL SANCHEZ

Levin, Gilbert, Scrivener, McRae, and Smith converse in a group. Levin has two pieces of cake. "Got a new puzzle that relates to the ideal shuffle I was looking for a while back. Guy in a cardroom proposed it as a bet. He and I each shuffle a deck of cards. We each turn over one card at a time, simultaneously, from the top of the deck, till we each reach the end of our own deck at the same time. He wanted to bet me we would never get a match; that is, at no time would he and I each turn over the same card at the same time. Of course, I felt we would, but I didn't bet him."

Gilbert sips coffee from a styrofoam cup. "Why not?"

"Because I know how those things work. I take the other side of his proposition—or maybe *his* side—and he asks me to give odds, or maybe not, but in any case he agrees, and I'm probably taking the worst of it. I don't know what the real odds are, and I don't know how to figure them."

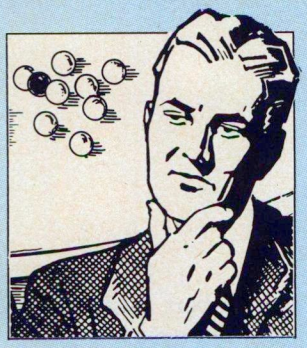
The Challenge

Send a complete program that shows which side has the best of it and by how much. Your program must be short, elegant, and self-documenting. The best solution wins a one-year subscription to *A+* and a Certificate of Excellence in Programming and will be published here (see next page for February's winner).

Please send all entries, which must be received by May 8, 1986, to Computer Calisthenics, P.O. Box 2329, Stanford, CA 94805. If you want us to return your entry, enclose a self-addressed, stamped envelope or diskette mailer. All entries become the property of the author. The winner will be selected by the author, whose decision will be final. The winning program will be announced in the August issue of *A+*. ✚

COMPUTER CALISTHENICS

FEBRUARY'S WINNER



Dennis McClement

Several entrants did not go beyond finding one set of answers to the February problem of the black-and-white marbles with a 50-50 chance of drawing at least one black. R. Trent Garverick, of Columbus, Ohio, wrote, "Have you lost your marbles?! . . . the solution is trivial . . . for any number of black marbles, simply set the total number of marbles to two times the number of black marbles and draw one marble." Thus, one black marble and one white, draw one, is a possible solution, as are two black and two white, ten black and ten white, and so on. That's true but does not conform to the conditions of the puzzle, which stated, ". . . remove x marbles and . . . at least one of those marbles will be black." You have to draw at least two marbles.

Others sent programs that provided solutions *close* to a chance of .5. Eric Nagler, of Santa Clara, California, showed that, for example, for 7 black marbles and 49 white, with 5 withdrawn, the chance is .499208339. Close, but not exact, and it gives one side of the proposition an edge. To avoid rounding errors, he, and others, had specified that the answer lie between .499 and .501, but that approach introduced another problem, namely of finding imprecise answers.

For one black marble, there are lots of answers, all drawing n marbles from a total of 2n marbles.

Dennis McClement, of Bellefontaine, OH, gets the prize for a C program that shows the answer for two blacks and the only other possibility not eliminated above.

Determine the number of balls (x) to draw from total balls (y) with (b) black balls and (y - b) white balls such that the probability of drawing at least one black ball = 0.5. Since at least one black ball is equivalent to all white balls, the program computes the total number of combinations of (y - b) balls, and the total number of combinations of y balls. The probability of all white is (y - b) C x / y C x. Cancellation of the quotient is employed to minimize round-off error of numbers like 99!.

Solution set is draw 2 from 21 total with 6 black and
draw 6 from 21 total with 2 black.
Several solutions with 1 black are not unique.
No other solutions with 1 < (x or y) < 100.

Dennis McClement - Bellefontaine, Ohio
Using DeSmet/Ouye C Development Package, V1.01 on Macintosh

```
main()  {
    int i, x, y, b;
    double n, d;

    while ( 1 ) {   /* loop */

    printf("\n\n enter number of black balls ( 0 to end ) ");
    scanf("%d", &b );
    if( b == 0 ) break;     /* until b = 0 */

        /* check total # of balls from at least b to at most 99 */
        for( y = b; y < 100; y++) {

            /* check # of balls to draw:  1 < x <= y / 2 for p = 0.5 */
            for ( x = 2; x <= y / 2; x++ )  {

                /* Accumulate numerator */
                n = 1.0;
                for( i = y - b - x + 1; i <= y - x; i++ )
                    n = n * i;

                /* Accumulate denominator */
                d = 1.0;
                for( i = y - b + 1; i <= y; i++ )
                    d = d * i;

                /* if p(all white) = 0.5 print solution */
                if ( ( n / d ) == 0.5 ) {
                    printf("\n for %d black balls draw %d from %d total ",
                        b, x, y );
                    printf(" balls for p = %f", n / d );

            }           /* next x */
        }               /* next y */
    }                   /* check another b? */
}                       /* end main */
```

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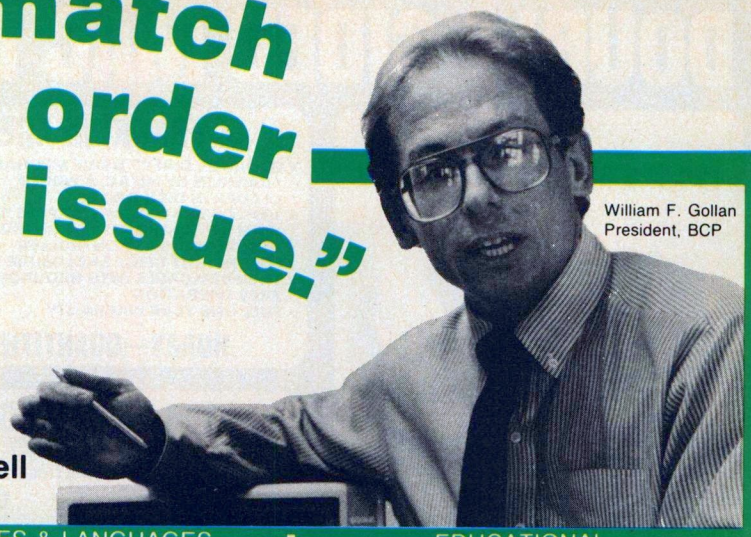

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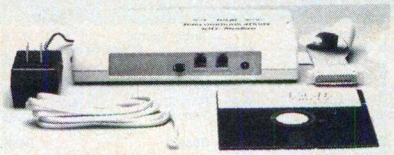

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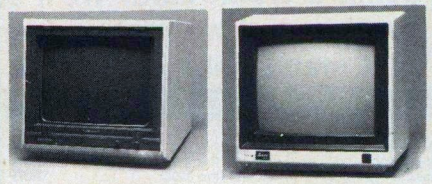

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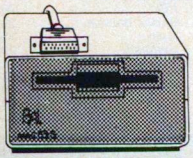

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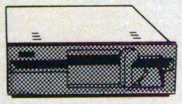

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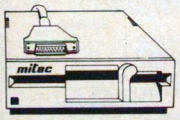

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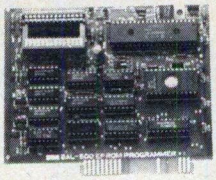

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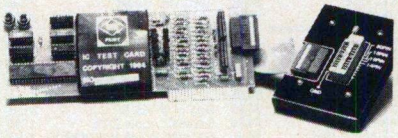

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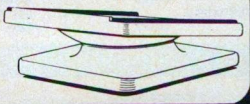

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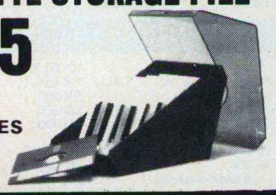

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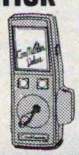

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CIRCLE 167 ON READER SERVICE CARD

BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

EXPLORING MORE GRAPHICS DELIGHTS

Princely printing, ampersand artistry, and identity crises

Figure 1: A double-hi-res image printed with Prince on an Epson JX-80 printer

This month we take a look at new and revised graphics software. Then, for those of you who know the ampersand only as a symbol for *and*, we have a short tutorial on the ampersand instruction and its function in graphics programming.

What's in a Name?

The people who make graphics software seem to be suffering from some sort of identity crisis. Take note: Penguin Software is now Polarware/Penguin Software, Inc., and the company's Magic Paintbrush, an abbreviated version of its Complete Graphics System, is now The Graphics Magician Junior.

Going from Penguins to Beagles, we find that Apple Mechanic is now called Shape Mechanic, and the second volume of Apple Mechanic Typefaces is now called Font Mechanic. Confused? If you are wondering whether you already own a new program, albeit under another name, or whether the upgrade is worth investing in, read on.

New Graphics Magicians

Polarware/Penguin Software has two new products: one for the Apple II and the other for the Macintosh.

The Apple II gets a revision of an older program. The folks at Penguin seem to have discovered that the name of that program, Magic Paintbrush, just didn't fly, so they put a little more magic in the product and rereleased it as The Graphics Magician Junior. GMJr is The Complete Graphic System's painting module, for those who need only a paint program and not a full-blown graphics system. With 96 brushes, 108 colors in hi-res, and 256 colors in double hi-res, you can do a lot of painting! If you already own the latest version of Penguin's Complete Graphics System, you don't need GMJr.

For those of you who know the ampersand only as a symbol for and, *we have a short tutorial.*

For the Macintosh, we finally have a version of the popular Apple II Graphics Magician (see "Making It Move: Part Two," *A+*, May 1985, pages 177–181). It contains both the picture/object and animation routines, and, yes, you can call them from your own Microsoft BASIC programs. We like it. More about the Mac Graphics Magician in an upcoming issue of *A+*.

We're glad to see Mark Pelczarski, the boss penguin, and his flock, continuing to support graphics people with solid, non-copy-protected software.

Two from Beagle Bros.

Not to be outdone by Polarware/Penguin, Beagle Bros. also has two new graphics products. One is a reissue of a classic Apple II program under a new name. Apple Mechanic has been revised and released under the name Shape Mechanic. The Byte-Zap utility is gone, but Hi-Writer and XTyper are still there. The mechanics of the shape and font editors are virtually unchanged, except for the following: letter commands have replaced numbers (E edits, S saves, and so on), and shape tables can hold up to 255 shapes. For most hobbyists, the original Apple Mechanic's 12 shapes to a shape table is adequate. The main reason for considering

ROBERTA SCHWARTZ

Shape Mechanic is the added program called Shape.Capture. This routine lets you capture any part of a standard hi-res screen for instant conversion into an editable shape-table shape. Shape Mechanic is a valuable utility.

More Fonts

Font Mechanic, also from Beagle Bros., contains 30 attractive new fonts for use with Shape Mechanic and Apple Mechanic. In addition, it includes font utilities. Font.Convert converts almost any non-Mechanic font into "shape fonts" that work with Apple Mechanic and Shape Mechanic. Font.Scaler lets you change the vertical and/or horizontal dimensions of all the characters in a font.

Prince has so many printing options that we can't cover them all in this column.

Both of these packages include two unprotected disks: a ProDOS version and a DOS 3.3 version. As usual, the packages contain decals, posters, and assorted interesting demos, programs, and programming tips. Thank you Bert Kersey and Jon and Mark Simonsen.

Prince for Printing

Prince, Baudville's new offering, is a full-featured color-printing program. The package comes with software, four iron-on color ribbons (you buy the package marked for the printer you plan to use), sample paper, envelopes, sticker/label stock, a cloth test patch for transfers, and a comprehensive manual illustrated with drawings and photographs.

This package has so many printing options that we can't cover them all in the space we have here. With Prince's ribbons and "craft kit," you can print hi-res and double-hi-res screens, in monochrome or full color, with or without a color printer. (If you don't have a color printer, you'll have to change ribbons for each color pass.) In addition to conventional screen dumps, you can print iron-on transfers (the Transfer option flops your image), labels (the Label option adjusts the printout to fit on 3.5-inch-wide label stock), and greeting cards (the left half of the image appears on the front of the card, and the right half appears inside the card when it's opened).

Using Prince, you can edit your images (scroll, crop, erase, and add text) and then choose from a variety of printing options. The Expert Print mode has 18 optional printing parameters, including margins, size, placement, rotation, density, and so on. Figure 1 is a double-hi-res image printed on an Epson JX-80. From the Print menu, we chose Black: Prints black, Print Color:All, Print Size:Small, Print Mode:Normal and Color:Dark.

Prince is, indeed, a prince of a printing program.

New Paints for the Mac

MacPaint is a marvel, but it does have a few shortcomings: notably the inability to work on an area larger than the window, the lack of measuring tools such as rulers, and rotation limited to 90° increments. Until now, you could acquire these functions only by purchasing separate utilities that worked with MacPaint, as we described in our January 1986 column. Wouldn't it be wonderful if there were one paint program that offered it all. We're delighted to tell you that

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CIRCLE 159 ON READER SERVICE CARD

Several commercial programs provide graphics subroutines that you can summon from BASIC.

we recently saw prerelease versions of two new paint programs, one from Ann Arbor Softworks and the other from Silicon Beach Software, and both products have significantly more features than MacPaint does. By the time you read this, they should be on the market. Look for full reviews soon in *A+*.

Ampersand Artistry

As artists, we often need special effects in our presentations: graphic overlays, text, animation, and so on. Because of Applesoft BASIC's very limited set of graphics commands, we usually resort to custom assembly-language routines. Sometimes we use one of several commercial packages that enhance Applesoft's graphic capabilities. Most of these programs rely on the Applesoft ampersand instruction (&).

To understand how the ampersand works, let's look at how a normal Applesoft instruction works. When Applesoft receives an instruction, it looks into a table of valid (acceptable) instructions and tries to find a match. If it doesn't find a match, Applesoft prints SYNTAX ERROR. If it does find one, it uses the address of the subroutine that will carry out the command in the instruction table. The Applesoft command HOME, for example, has a jump to the monitor subroutine located at memory location 64600, which clears the text screen. CALL 64600, then, accomplishes the same function as the command HOME. Some of these subroutines (such as HOME) are located in the Apple Monitor ROM, but most are located in the Applesoft ROM.

The ampersand command contains a jump to a subroutine stored at an address in page 3 of RAM ($035F, or 863 in decimal). This address normally points to a Return instruction (as from a subroutine), so nothing visibly happens. By changing the contents of this address so that the computer jumps to a valid machine-language subroutine, you can make the ampersand do almost anything.

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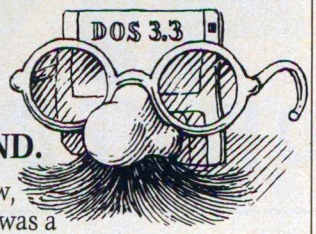

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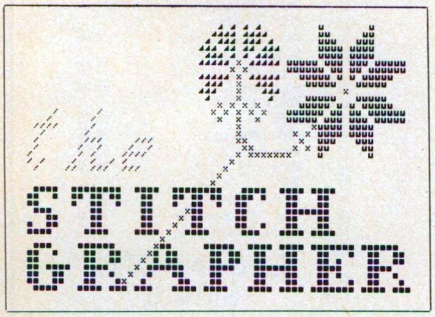

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Several commercial programs provide graphics subroutines that you can summon from BASIC with the ampersand instruction.

Grafmagic

Grafmagic, by Stuart Cowan, is available from many users'-group libraries and is the product we have had the most experience with for this purpose. The program offers a well-balanced collection of graphics routines, including text, windows, fills, and Logo-like turtle-graphics commands. Grafmagic works with either hi-res screen and creates a third frame buffer that comes in handy as a work area for animation. It even provides an alternate coordinate system with the origin (0,0) in the center of the screen, rather than in the standard upper left corner.

Grafmagic's windows are among the program's most powerful features. You define a window with the &WI command. For example, &WI(0,10,20,30) creates a window 10 pixels wide and 30 pixels deep, with the upper left corner at 0,20. Once that you have defined a screen area as a window, you can move it to another frame buffer in a variety of ways—with magnification or scaling on the horizontal and/or vertical axes, for instance. Further, you can capture any window and add it to a shape table. (Grafmagic shapes are not vector shapes like Applesoft shapes; they're bit-mapped block shapes.) Other programs can save and retrieve the shape table for animation or other graphic pyrotechnics.

To give you a taste of programming in Grafmagic, here is the program, adapted from a demo on the Grafmagic distribution disk, that produced the screen in figure 2. (You must have Grafmagic installed to actually use this program.)

```
10 &RESET:&CLS:&PAGE(2)
20 &PICTURE("SHAKESPEARE.PIC")
30 &SCALE(0,96,1:2,1:1)
40 K=90/191
50 FOR I = 0 TO 191
60 &WI(-140,280,I-95,1)
70 &ROT(0,-95,180+K*I)
80 NEXT I:&FULL:&PAGE(1)
90 &WI(-140,70,96,48):&ER:&PAGE(2)
100 &FULL:&SCALE(-140,96,1:4,1:4)
110 &PAGE(1):&CH(2,1,1):VTAB 23
120 HTAB 6:PRINT"The Bard of Avon"
```

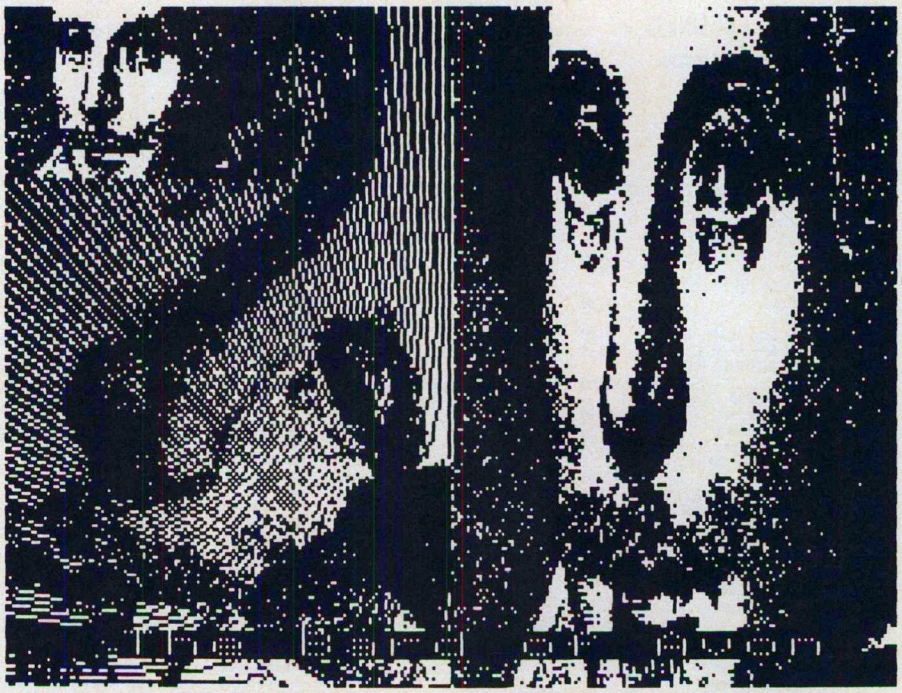


Figure 2: A digitized photo of Shakespeare has been moved into three windows by a short Grafmagic program. The window in the upper left corner of the screen represents a 1:4 reduction of the full-screen photo. The half-screen image in the left window has been rotated line by line, and the half-screen image in the right window was transferred with a 1:1 ratio on the y axis and a 2:1 ratio on the x axis.

Comparing Ampersand Programs

Several other ampersand utilities can similarly enhance your Applesoft graphics programs. They include Graphicmaster from TidBit software, Cat Graphics from Polarware/Penguin Software, and Beagle Graphics from Beagle Bros. Each of these programs offers special features that may warrant their use.

Graphicmaster lets you manipulate fonts in many ways, including kerning. It allows for up to eight predefined windows on a screen. Graphicmaster also has an extended palette of 32 dithered colors.

Cat Graphics offers a choice of hi-res or double hi-res, and it features Circle, Curve, and Box commands, as well as interesting special effects such as &OUTLINE and &REFLECT. Cat Graphics also gives Applesoft programmers easy access to the Penguin extended color palette of 108 hi-res colors or 256 double-hi-res colors.

Beagle Graphics works only in double hi-res. Although it has the fewest commands, its smallness can be an advantage, because you can easily relocate it to an unobtrusive area of the Apple's memory.

After you've mastered Applesoft's standard plotting commands, examine some of these products. With them, you don't need to be an assembly-language wizard to produce eye-opening graphics programs.

Where's the Book?

To those of you who've written for information about our book (*Apple Graphics: Tools and Techniques* [Prentice-Hall]): As we write this column, in January, the book has started shipping. Some printing delays added about six months to the expected release date. We're pleased with it, and we think that you'll find it a useful reference. ✚

PRODUCT INFORMATION

Beagle Graphics, Shape Mechanic, and Font Mechanic
Beagle Bros. Micro Software, Inc.
3990 Old Town Avenue
San Diego, CA 92110
(619) 296-6400
List Price: Beagle Graphics, $59.95; Shape Mechanic, $39.95; Font Mechanic, $29.95
Requires: Beagle Graphics—128K Apple IIe or IIc; Shape Mechanic and Font Mechanic—II Plus, IIe, or IIc
CIRCLE 406 ON READER SERVICE CARD

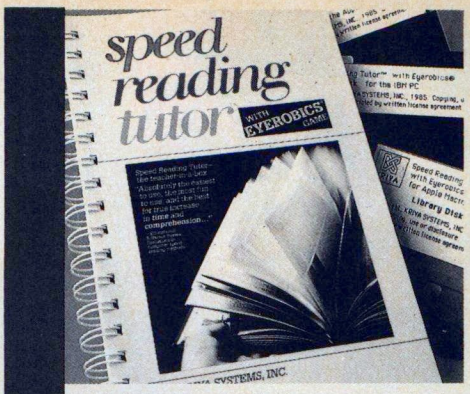
Cat Graphics
Polarware/Penguin Software, Inc.
P.O. Box 311
Geneva, IL 60134
(312) 232-1984
List Price: $34.95
Requires: Apple II Plus, IIe, or IIc; 64K RAM
CIRCLE 407 ON READER SERVICE CARD

Grafmagic
Stuart Cowan
Unit 5, Site 203
Campbell River, B.C. V9W 5T7
(604) 923-5510
List Price: approximately $10 (available from users'-group libraries)
Requires: Apple II Plus, IIe, or IIc; 64K RAM
CIRCLE 408 ON READER SERVICE CARD

Graphicmaster
TidBit Software
P.O. Box 5579
Santa Barbara, CA 93108
(805) 969-5834
List Price: $79.95
Requires: Apple II, II Plus, IIe, or IIc
CIRCLE 409 ON READER SERVICE CARD

The Graphics Magician Junior and **The Graphics Magician—Mac**
Polarware/Penguin Software
P.O. Box 311
Geneva, IL 60134
(312) 232-1984
List Price: The Graphics Magician Junior, $34.95; The Graphics Magician—Mac, $49.95
Requires: The Graphics Magician Junior—Apple II, II Plus, IIe, or IIc, 64K RAM; The Graphics Magician—Mac—Macintosh
CIRCLE 410 ON READER SERVICE CARD

Prince
Baudville
1001 Medical Park Drive S.E.
Grand Rapids, MI 49506
(616) 957-3036
List Price: $69.95
Requires: Apple II Plus, IIe, or IIc; printers: Epson MX-80, FX-80, RX-80, JX-80, Apple ImageWriter I or II, DMP, C.Itoh 8510/Prowriter, 8510SC, or NEC 8023
CIRCLE 411 ON READER SERVICE CARD



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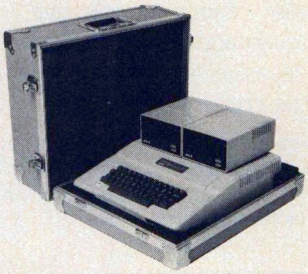

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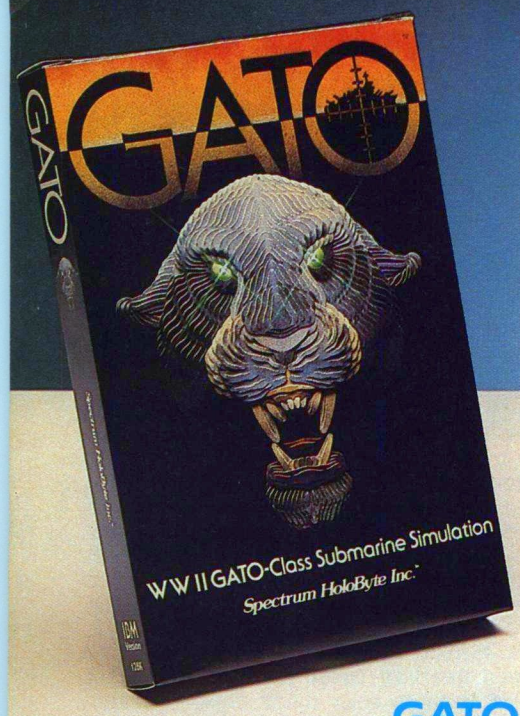

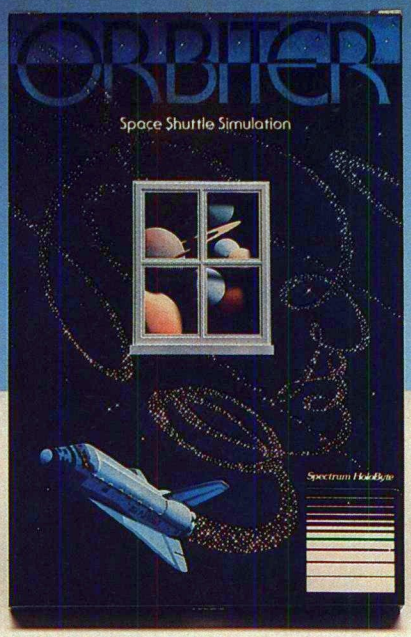

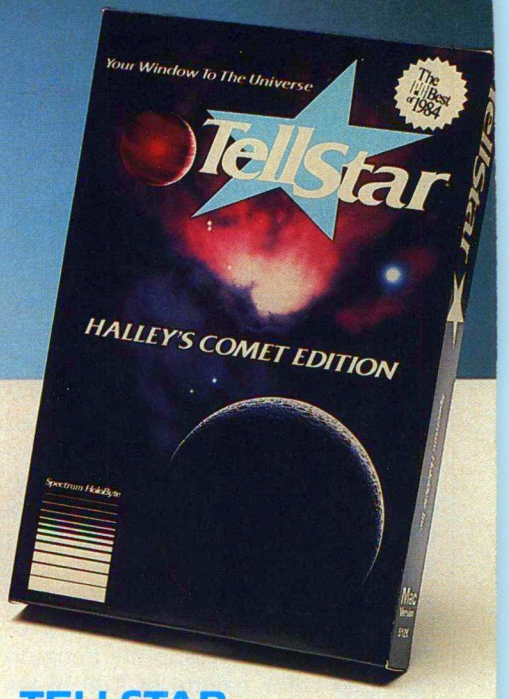

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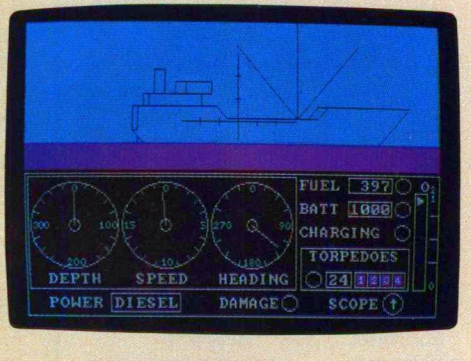
(IBM requires 128K, color graphics card, graphics monitor, double-sided drive. Apple IIe™ or IIc™ requires 128K, single-sided drive. Joystick optional. Macintosh requires 128K.)



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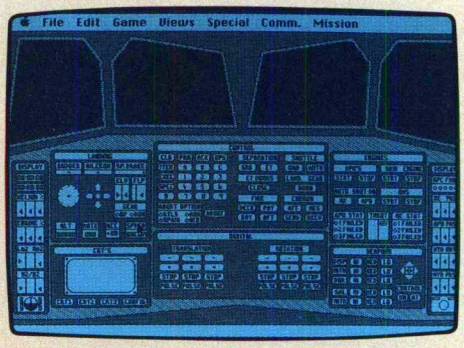

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(IBM® requires 256K, color graphics card, graphics monitor, double-sided drive. Available March, 1986. Macintosh™ requires 512K, single-sided drive.)

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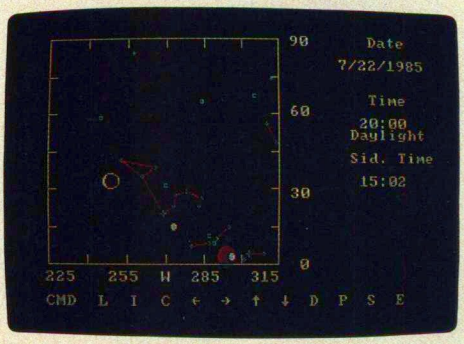
(IBM requires 128K, color graphics card and monitor, double-sided drive, 8087 version available for faster processing. Apple II series requires 64K, single-sided drive. Macintosh requires 512K.)



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The Macintosh Section

The Macintosh Plus' SCSI interface has spawned a slew of interesting new mass-storage devices.

MAC PLUS UPDATE *BY THOM HOGAN*

PRODUCTS that talk SCUZZY

Apple computer promised us that the SCSI (Small Computer System Interface) port on the Macintosh Plus would attract oodles of new and useful products to the Mac market. After all, here was the first break in the closed-architecture dam that had previously frustrated potential Mac hardware manufacturers.

In most of the first accounts you may have seen about the SCSI port, you probably learned of the port's raw speed. "The Mac will be faster" went the promise. True, but the added speed of the SCSI port is not its most important benefit.

Fortunately, Apple has provided a little more than just a SCSI port. The rewritten ROM of the Macintosh Plus adds just enough spice to make the computer more palatable to serious users. For example, the new ROM is based on the HFS (hierarchical filing system), used first on the Apple 20-megabyte hard-disk drive, which means that you can store a virtually unlimited number of files on any mass-storage device hooked to the SCSI port. Furthermore, the ROM looks to the SCSI port when it doesn't find a disk in the internal drive, so a device hooked to the SCSI port can be the boot, or startup, device. All of the units I discuss here work with HFS and boot automatically if no disk is in the internal drive.

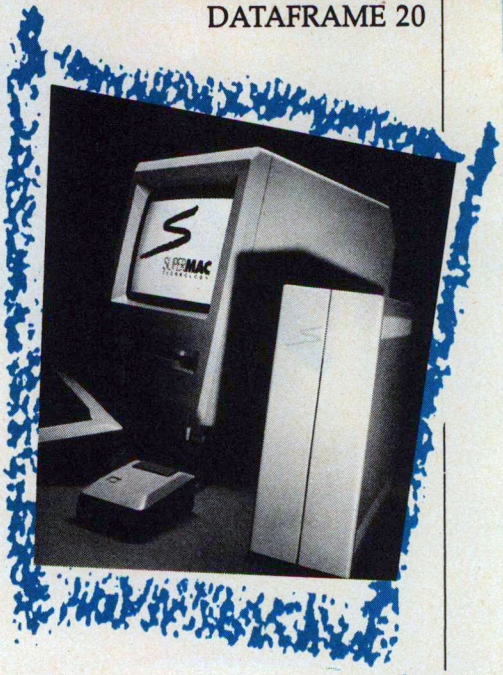
And, yes, the SCSI port operates at a data-transfer rate almost 20 times faster than the maximum (unclocked) speed of the serial ports on the original Macintosh. Be forewarned, however, that this speed increase doesn't mean that a hard-disk drive plugged into the SCSI port operates 20 times faster than one plugged into the serial port. A good deal of the wait to open or retrieve files on a Macintosh is due to the CPU's calculating what's to be fetched, where it's to go, and generally how to get the right information into the right place in memory. Furthermore, the physical speed of the hard-disk drives themselves often turns out to be the major factor in overall file-transfer speeds (a 3.5-inch hard-disk drive works faster than a 5¼-inch drive, for example, simply because the information is packed closer together and the head has less distance to travel).

But enough about the SCSI ports in general. Just what can you get today that'll fatten up the mass-storage capabilities of your Macintosh Plus?

MDIDEAS HD-20

IOMEGA
BERNOULLI BOXES

SUPERMAC TECHNOLOGY
DATAFRAME 20



THE HARD DISKS

Bunches of hard-disk drives were announced in conjunction with the Macintosh Plus introduction. Most have advantages beyond basic speed of operation.

IOMEGA BERNOULLI BOXES

From Iomega, for example, come five new Bernoulli Box systems for the Mac Plus. Single-drive systems are available in 5-, 10-, and 20-megabyte configurations, and you can also get dual-drive 10- and 20-megabyte systems. The 8-inch Bernoulli disk cartridges are removable from the drive, and their rugged design makes them less vulnerable to damage during transport or storage than even the traditional Mac diskettes.

Further, Iomega is promising a utility that will let you take a Bernoulli cartridge from an IBM PC system and read its files when you insert it into an Iomega-equipped Macintosh. Since some of the more popular Mac software (Multiplan, Excel, and Jazz, for example) allows the direct import of IBM-formatted data, this transfer option may be a real boon to companies that use both IBMs and Macs. A version of Iomega's Bernoulli Box works as an AppleTalk network server.

MDIDEAS HD-20 and HD-30

MDIdeas has entered the Mac Plus hard-disk-drives market with two drives, 20- and 30-megabyte hard-disk drives. Both units sit underneath a Mac Plus and utilize 5¼-inch hard-disk drives with their own power supply. The manufacturer claims to have recorded raw speed increases of up to 16 times when its hard disk is measured against the serial-port-based hard-disk drives that heretofore dominated the Mac world. Both units include a fan for temperature control.

SUPERMAC TECHNOLOGY DATAFRAME 20

Another 20-megabyte drive that hooks to the SCSI port is the SuperMac Technology DataFrame. Designed to sit alongside the Mac Plus, the DataFrame is a slender three inches wide and eight inches tall. No installation is necessary—the disk comes preformatted, so all you have to do is connect the cable, turn on the power, and wait for the Mac Plus to recognize the unit. Unlike some of the other SCSI drives, the DataFrame does not have a fan; instead, it uses capacitive cooling, as the Mac does.

UNIVATION'S SLIMLINE

UNIVATION'S SLIMLINE

One of the more novel hard-disk-drive units for the Macintosh Plus is Univation's SlimLine SubSystem, a unit that looks a bit like a slim MacCharlie, in that it sits underneath and alongside the Mac in a sort of inverse L enclosure. The handsome enclosure closely matches the Macintosh case design and color, resulting in a professional-looking installation.

Three versions of the SlimLine are available, with 20, 30, and 40-megabytes of fixed hard-disk-drive space, all with 10 megabytes of removable disk media. The removable hard-disk cartridge allows for quick and complete backup of important data without making you resort to an additional tape subsystem.

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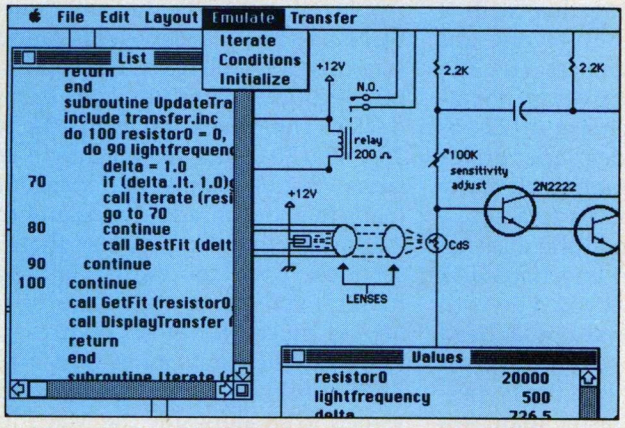

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- Structure your code using separately compiled modules, statement functions, block IF, block DO and SELECT CASE constructs.

Interactive Window-Oriented Source Debugger
- View your source file while debugging.
- Single-step through your program.
- Set source-level breakpoints to control execution.
- Examine and modify your variables.
- Search source code for labels or line numbers.
- Examine file status for all units.

Extensive Toolbox Interface
- Access over 475 built-in Macintosh toolbox functions, including windowing, cursor handling, pull-down menus, mouse tracking, event queue handling and desk accessory management.
- Draw using powerful Macintosh graphics routines: points, rectangles, ovals, arcs, polygons and regions.

Library Manager
- Build your own libraries of useful subprograms.
- Include over 200 procedure files per library.
- Mix FORTRAN and assembly language procedures.

Object Code Linker
- Dynamically link routines as needed while executing.
- Statically link subprograms for faster execution.

Other Productivity Tools
- Apple's source code editor—optimized for faster programming.
- Apple's resource compiler—takes advantage of special Macintosh capabilities.

System Requirements
- 128K Macintosh.
- One disk drive.

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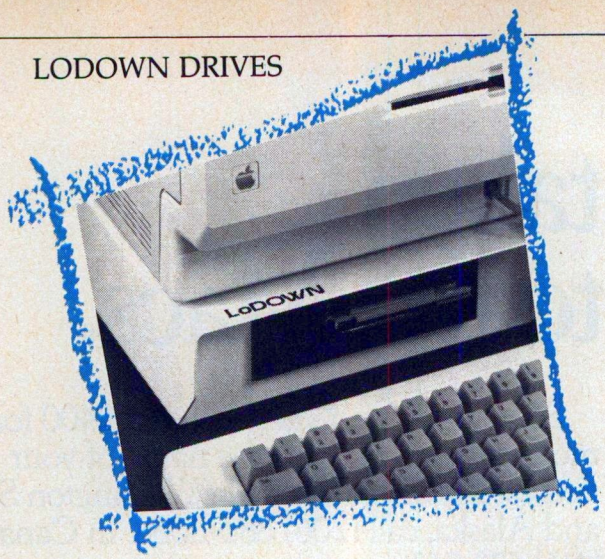
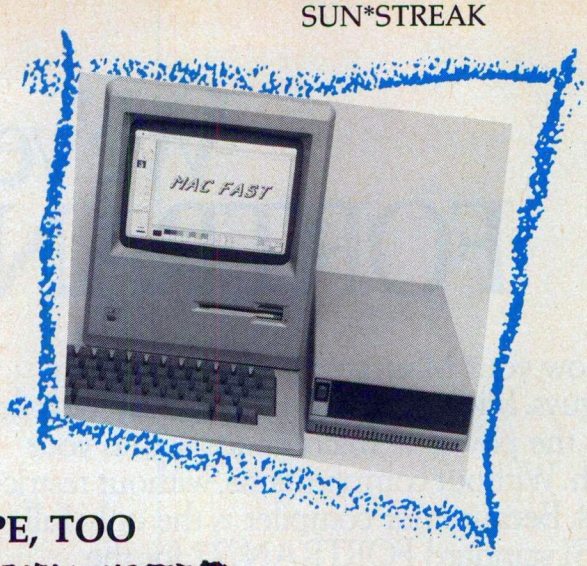
LODOWN DRIVES



SUN*STREAK



AND TAPE, TOO

AST-4000 COLOSSUS

Probably the biggest company to have announced a SCSI device for the new Mac Plus is AST, known primarily as a maker of add-on boards for IBM PC-series computers. Its offering is big too: a 74-megabyte hard-disk-drive unit with a 60-megabyte cartridge-tape backup drive built in. You can purchase add-on units to expand the hard-disk storage capacity to 370 megabytes.

Probably the biggest company to have announced a SCSI device for the Mac is AST, known primarily as a maker of add-on boards for the IBM PC-series computers.

The AST-4000 Colossus is a large-capacity mass-storage device designed primarily for networks. AST thinks that such devices are pivotal to making computers productive in office settings.

Besides the large capacity, the Colossus features fast 30-millisecond access times, 32-bit ECC disk-error correction, power-on diagnostics, and a complete backup utility that allows you to save the hard-disk data by volume or by file.

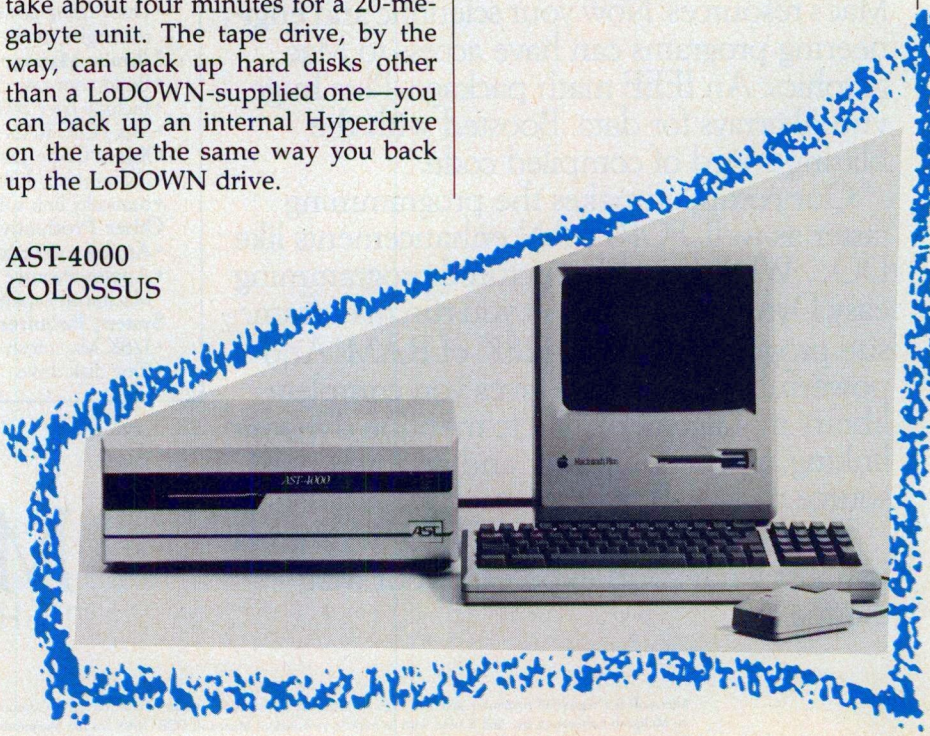
LoDOWN DRIVES

AST isn't the only company that's put a tape-backup unit together with a hard-disk drive. LoDOWN one-ups AST by providing 12 choices: 10-, 20-, 40-, or 80-megabyte drives by themselves or with your choice of 22- or 60- megabyte cartridge-tape drives for backup. You can connect as many as eight LoDOWN drives to a single Mac Plus, resulting in a phenomenal 640 megabytes of on-line hard-disk storage (although what you'd do with eight tape-backup drives is a head scratcher). LoDOWN claims its drives are three times faster than the Hyperdrive and ten times faster than Apple's Hard Disk 20. Tape backups take about four minutes for a 20-megabyte unit. The tape drive, by the way, can back up hard disks other than a LoDOWN-supplied one—you can back up an internal Hyperdrive on the tape the same way you back up the LoDOWN drive.

SUN*STREAK

Sunol Systems, an early supporter of AppleTalk networks, has announced SUN*STREAK, a series of various-size drives coupled with an optional 60-megabyte cartridge-tape backup device. The drives comes in 10-, 16-, 25-, 45-, 70-, and 110-megabyte versions. Sunol claims that MacPaint loads in about three seconds and that AppleTalk initializes in less than 13 seconds, both substantial improvements over the current state of the art, as most Macintosh owners can tell you. The units come with a file-by-file backup utility and are designed to sit alongside the Mac Plus.

AST-4000
COLOSSUS



FOR APPLETALKERS

3COM DISKPLUS

From the folks at 3Com, primary promoters of the Ethernet standard of networking computers, comes a nifty little box called DiskPlus. Designed for smaller groups than its EtherMac systems (which can accommodate up to 31 AppleTalk users at once), DiskPlus is a 70-megabyte hard-disk drive and network server that plugs into the SCSI port of your Mac Plus. If 70 megabytes isn't enough storage, you can daisy-chain seven of these drives together, providing almost half a gigabyte of storage space.

DiskPlus works best for six Mac users or less, but you can upgrade to the full EtherMac server by purchasing the server's processor unit. For a single user, the 30-millisecond access time of the 70-megabyte drive means *very* fast access to data on the hard disk (an IBM PC XT, for example, has track-to-track access times of 70 milliseconds, with far less data per track—it would seem slow compared with the DiskPlus unit).

Coming Soon to a Macintosh Plus Near You

Although no such announcements were made prior to press deadline, I fully expect to see a few other devices sidling up to the Macintosh Plus' SCSI port in the very near future. At the top of the list is a CD-ROM drive or two. A CD-ROM is a read-only drive that Gets Data off a 4¾-inch disk. And when I say it Gets Data, I do mean Data with a capital D: 550 megabytes' worth per disk. If you wonder how much data that is, in the IBM PC world, one group put the entire library of public-domain software (several hundred diskettes' worth) and the entire text of the Bible onto one CD-ROM. At that, 90% of the disk was blank! On the Macintosh, imagine a MacPaint picture-library disk with tens of thousands of MacPaint files on it. Luckily, Apple developed HFS, or we'd never be able to organize such a wealth of graphical data.

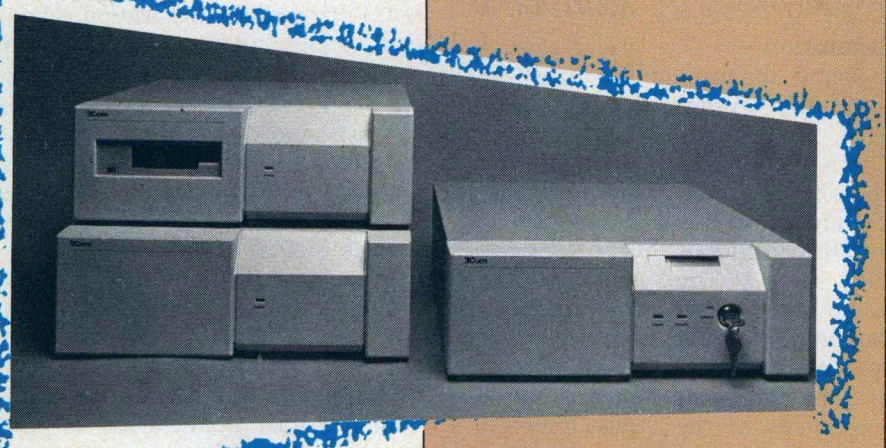
SCSI is much more than a method of hooking up mass-storage devices. Simply put, it is a high-speed, 8-bit parallel interface. Until the Macintosh Plus, the Macintosh world didn't have a parallel port available to it (except through awkward external translators).

The university connection will probably find uses for the SCSI port that even Apple wasn't considering when it designed it.

Laboratory data sampling, parallel-process control, and a host of other tasks are now within the Mac's reach. There's nothing scuzzy about that at all. ✚

Thom Hogan is a well-known book author and is currently attempting to start a company called Not Again, which is dedicated to designing software unlike anything you currently use.

3COM DISKPLUS



FURTHER INFORMATION

Iomega Corporation
1821 West 4000 South
Roy, Utah 84067
(801) 778-1000
List Price: single drive—5 megabytes, $1795; 10 megabytes, $2495; 20 megabytes, $3095; dual drive—20 megabytes, $3495; 40 megabytes, $4495; network server—20 megabytes, $3750
CIRCLE 443 ON READER SERVICE CARD

MDIdeas, Inc.
1111 Triton Drive #205
Foster City, CA 94404
(415) 573-0580
List Price: HD-20, $1095; HD-30, $1595
CIRCLE 444 ON READER SERVICE CARD

SuperMac Technology
1901 Old Middlefield Way
Mountain View, CA 94040
(415) 964-8884
List Price: $1095
CIRCLE 445 ON READER SERVICE CARD

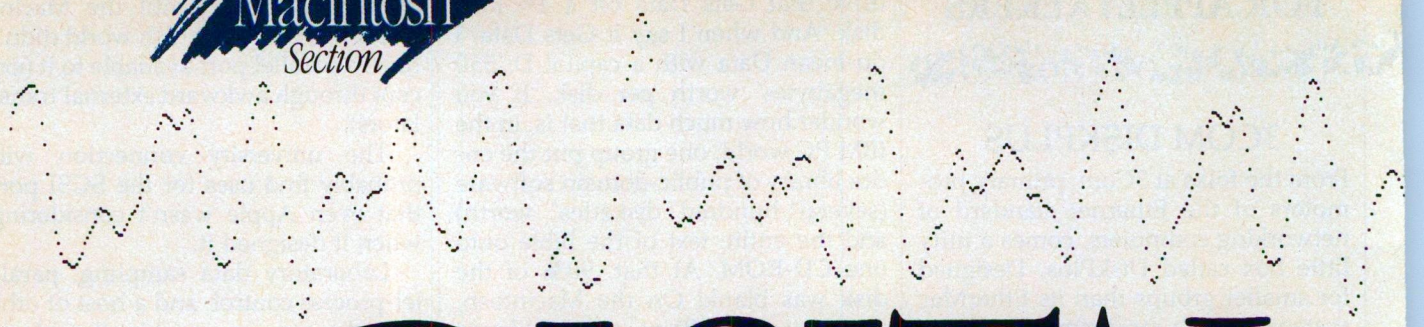
Univation
1037 North Fair Oaks Avenue
Sunnyvale, CA 94089
(408) 745-0180
List Price: SlimLine 20 + 10, $2995; SlimLine 30 + 10, $3295; SlimLine 40 + 10, $4495
CIRCLE 446 ON READER SERVICE CARD

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 863-1333
List Price: $6995
CIRCLE 447 ON READER SERVICE CARD

LoDOWN
P.O. Box 5146
Pleasanton, CA 94566
(415) 426-1747
List Price: Disk only—LoDOWN-10, $795; LoDOWN-20, $995; LoDOWN-40, $1995; LoDOWN-80, $3995; tape drives—LoDOWN T20, $895; LoDOWN T60, $1795
CIRCLE 448 ON READER SERVICE CARD

Sunol Systems
1187 Quarry Lane
Pleasanton, CA 94566
(415) 484-3322
List Price: 10 megabytes plus tape, $3345; 16 megabytes, $3845; 125 megabytes, $4345; 45 megabytes, $5945; 70 megabytes, $6645; 110 megabytes, $8345
CIRCLE 449 ON READER SERVICE CARD

3Com Corporation
1365 Shorebird Way
Mountain View, CA 94039
(415) 961-9602
List Price: DiskPlus 3Server Expansion Disk, $4995; accessory kit including cable, software, and manual, $150
CIRCLE 450 ON READER SERVICE CARD



DIGITAL

BY ANTHONY REVEAUX

SoundCap from MacNifty Central and Natural Sound from Magnum Software can help turn your Mac into a multimedia studio.

In the beginning there was MacPaint—with it we could create graphics with astounding ease and clarity. But there was a limit to what most of us could draw by ourselves. So then came video and optical digitizers such as MacVision and Thunderscan, capable of taking pictures of anything and bringing them to the Mac screen.

With composition programs such as MusicWorks and ConcertWare, we could make the Mac a Tin Pan Alley, spinning tunes of our own. But even backed up by the Macintosh's hip sound chip, we still weren't a big band. Now—(trumpet fanfare)—we have sound digitizers for the Mac. They can capture any sound—voices, music, or sound effects—digitally "sample" it, and record it to a sound file.

Systems such as SoundCap and Natural Sound permit the creative manipulation of audio information in ways similar to how MacPaint helps you modify visual material. You can raise and lower the volume of selected parts of the sound; stretch or compress, repeat, invert, echo, and reverberate sounds; and mix different ones together. With the ability to include sounds as well as pictures, your Mac can become an experimental media studio. You can use SoundCap files with VideoWorks and Natural Sound files with Slide Show Magician.

Sound Resolution

Digital sound, the principle behind the crystalline fidelity of compact discs (CDs), is what makes it all possible. Sound waves are analog in nature; they are continuous and—well, *wavy*. The computer, however, needs information in the form of bits—like a fire-hose stream of dots. The hardware components of the SoundCap and Natural Sound digitizers are circuits within small boxes with cables that connect to the Mac's modem or printer port.

Analog-to-digital converters, they squeeze waves into dots at speeds your Mac can accept. They do so in "samples," which are like clusters of dots. The sampling rate determines the resolution of the digitized sound. The more clusters per second (between 5000 and 22,232 here), the higher the resolution, or fidelity, of the sampled sound.

Sound digitizers can capture any sound, digitally 'sample' it and record it to a sound file.

The analogy to hi-fi CDs stops about here. The converted dots-from-waves are true sounds, not synthesized ones, but the 11-kilohertz playback-frequency aperture—or Nyquist limit—of the Mac is of a comparatively low fidelity about equal to the quality of an AM radio. Therefore, even a Walkman-type personal cassette player is an acceptable audio-input source for these products. It offers tabletop convenience as well as impedances that will not cause voltage problems.

The manufacturers suggest that you record your sounds on tape in preparation for digitizing. I found my dubbing deck to be a great help in assembling a variety of sounds on one master source cassette. You can use microphones directly with these digitizers.

MacNifty SoundCap

SoundCap's 4 × 5-inch box has a knob for incoming gain control and a green LED that glows when monitoring or recording digitization is taking place. It also has an RCA jack for audio input, a 1/16-inch jack for remote control of devices, and cables for both. A voltage adapter for the Macintosh Plus is available. SoundCap's program was written by Mark Zimmer and Tom Hedges of Fractal Software, whose sound-digitizing code is in the widest use for Macintosh applications at this time.

You control Sound-

SOUND FOR THE MAC

Productivity and business software, besides games, will benefit greatly from sound.

Cap's operations from one major editing screen (see figure 1) that has an icon strip at the left with Record, Playback, Oscilloscope, Echo Box, and Spectrum Display. The menu bar above contains other features in the Sound Effects, Options, and Special menus, and you can control many of them directly from the keyboard. When you are ready to record, a click on the Record icon brings up a query box (see figure 2) that asks you how many seconds of sound you want to capture. When used with a tape recorder, compact disc player, or VCR that has a remote-input jack, the remote-control cable can cause the audio source and the digitizing activity to begin at the same time. It acts like the Synchro-Start com-

MAX SEABAUGH

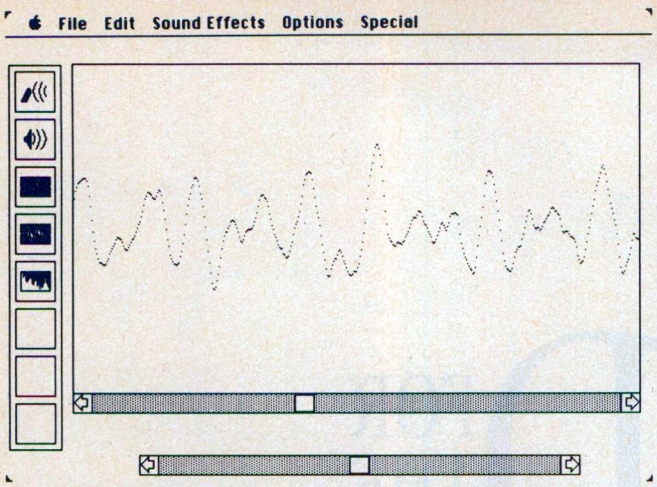


Figure 1: The Celtic Harp's clean waveform after recording in SoundCap

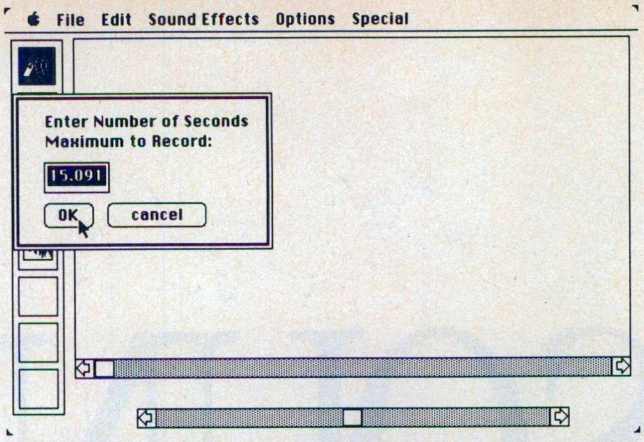


Figure 2: After setting the recording volume level in SoundCap with the oscilloscope, you control its input with the gain-control knob and click on the microphone icon to record. The Query box opens and shows the maximum length of the recording available.

mand on a dubbing deck.

The average sound file is about 15 seconds long. You can change the sampling ratios on the Special menu to gain longer playing times or shorter lengths that enjoy higher sound resolution. For voice and most sound effects, lower sampling rates are usually adequate. The greater the harmonic range of the sound, the more advantageous a high sampling rate. At setting 2, the sampling rate is 30 seconds long, and at 4 it is at the maximum, approximately one minute.

As you may have guessed by now, you're not going to be able to shoehorn all of *Thus Spake Zarathustra* into one file or even into one disk. It takes a machine, such as a Kurzweil or a Mirage, that costs thousands of dollars, to digitize such large works. The miracle is that the Mac can do it at all. Memory enhancements as realized in upgrades, hard disks, and the Macintosh Plus will greatly expand the range of what you can do with sound digitization.

Clicking on the speaker-shaped icon gives you instant playback, and you can set the number of repetitions you want to hear on the Options menu (see figure 3). A scratch bar below lets you vary the playback speed and pitch by scrolling back and forth, and the Oscilloscope command gives you a real-time oscilloscope pattern. Not only is it of visual interest, but it monitors the sound before recording and is essential for editing. The Echo box gives you an echo effect, and you can adjust the time delay of the reverberation. The spectrum display provides a real-time updating bar chart for technical and scientific applications, and you can select the number of samples for the Fourier transform from the Special menu.

SoundCap offers several more ways to measure and sculpt sound: amplification, low pass, downsampling, noise, ramping, flanging, silence, zooming the waveform, and even mirroring it backward. (See if those rumors are true about what they're *really* saying on those rock records!) You select an area of the waveform by darkening it to make it available for manipulation with these effects. Data compression is available—and often necessary—to save disk space.

You can cut and paste within the file, advancing

SILENT NO MORE

The whir of the disk drives and the bright, bouncy beep at the start—they have probably been the only music your Mac has made since most of you opened the box. Just as the coming of the talkies transformed the movie industry, however, and broadcast television and video are now going stereo, so using the Macintosh is becoming aural as well as visual.

Airborne, the arcade game with the symphonic *Apocalypse Now* start-up sound, was one of the first products to bring digitized sound to the Mac. The graphic adventure game Enchanted Sceptres uses dozens of realistic sound effects, from moans and groans to door slams and birdcalls. The word from the developer community is that soon no one will be releasing any entertaining software without full, digitized sound. Games may come out with continuous background music. Programmers working on a wide variety of applications are integrating digital sound into their designs.

Productivity and business software, besides games, will benefit greatly from sound. Listening to a voice-over telling you to back up a file reduces the visual clutter of dialog boxes in your spreadsheet or flow chart. Flight simulators such as Fokker Triplane make use of sound interactively, providing constant feedback on speed and status.

More programs will link action and information by sound, but any sound that goes beyond a beep is a memory muncher. The more memory that becomes available, the more likely your software will talk back to you. The Macintosh Plus is here now, and the coming gigabyte generation of optical disks and CD ROMs is less than two years away. Are you ready?

Soon no one will be releasing entertaining software without full, digitized sound.

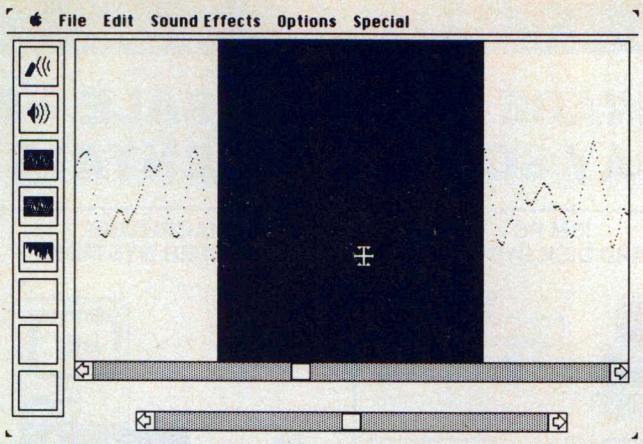


Figure 3: The Resident's contemporary rock sound of processed voice and synthesized instrumentals creates this waveform in SoundCap. You can manipulate the darkened area with whatever effect you choose from the menu.

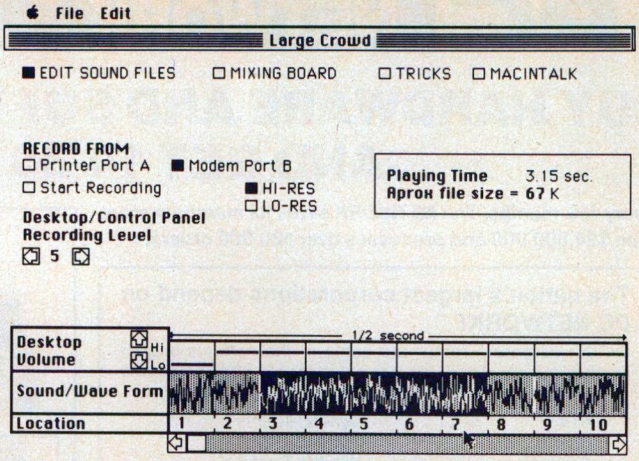


Figure 4: The voice file of Beniamino Gigli is about to have a segment of it echoed by digital means on the Natural Sound Tricks screen.

and backing up with the scroll bar; mix files and then further modify copies of them for special mixes; and overlay many mixes and offset overlays to build canonical, "Row, Row, Row Your Boat," forms.

I tested a prerelease version of a companion product to SoundCap, Fractal's Sound-to-Video transfer utility. It performed correctly, permitting the import of SoundCap files into VideoWorks. In a VideoWorks program, the sounds are available on the SFX menu under Samples 1, 2, and 3, each containing up to seven files. You can cut and paste the digitized sound, just like all the other SFX sounds, throughout the animation. Fractal Software claims it is readying a transfer utility for ConcertWare Plus as well. Studio Session, which is "nearing completion," will be the firm's new, six-voice, digital music-construction program that will accept SoundCap files.

Fractal has packed four irresistible sonic Goodies into SoundCap. As I write, my Mac makes sounds eerily like those of my old IBM Selectric—tippy-taps, carriage-return *zing*, and all—when I've installed TypeWriter in the System of my MacWrite disk. Like Screen Maker, the utility that can replace the startup image, SoundInit can change the startup *bonggg* we always hear. Mine gets going with a Tibetan Buddist chant, but you might perfer a cuckoo clock or a cat's meow. BeepInit replaces the Mac's on-screen warning tone with a cuter one, and Sound Play plays back any sound file.

Magnum's Natural Sound

The compact Magnum box is 2 × 2¾ inches, and the hard-wired control cable ends in a ⅛-inch jack plug. Natural Sound comes with an Editor disk, and two volumes of Sound Effects are available separately. They include sounds such as trumpet fanfares, an ocean liner, a dog barking, and a cash register. Some of them, extended through repetition, lack polish, but they all succeed in providing instant clip art for the ears, ready for experimentation. Natural Sound was designed to work directly with Magnum's Slide Show Magician program.

Natural Sound's Macintalk facility works with any Macintalk-compatible program, such as VideoWorks, but otherwise Natural Sound works only with Slide Show Magician at the time of this writing.

If you have ever seen a product demonstration or users' group introduction running by itself on a Mac, you were probably being entertained by Slide Show Magician. Slide Show Magician provides the means to produce audiovisual programs easily on a disk. You can take any image

THE MULTIMEDIA MAC

Your Mac's sound generator can sing in four simultaneous voices in frequencies up to 11 kilohertz and is capable of synthesizing speech, but its song has to squeak out through a little three-inch speaker *in back* of the case. Here's how to reconfigure your work/playstation for higher fi.

If you have an audio system and can position its speaker(s) nearby, prepare a patch cord with a ⅛-inch port plug at one end and plug it into your Mac's audio-output port. Inserting the plug automatically disables the Mac speaker. Connect the other end of the cord—with the appropriate kind of plug—into any high-level input jack in your amplifier, such as an auxiliary. A Y-splitter adapter plugged into the left and right auxiliary input jacks of a stereo system distributes the Mac's monophonic signal equally between speakers.

You can even wire in a portable "boom box" to help boost your Mac's rap. Or you can connect a pair of Bose Roommate compact speakers directly, without the need of an amplifier. The MacNifty Stereo Music System, which you can purchase separately, is designed specifically for the Mac. A small, sturdy amplifier with two minispeakers, it offers synthesized stereo—differentiating frequencies between left and right speakers—with good results.

For serious multimedia work, a MacNifty Switch—either the two-way or the four-way version—helps you select among your audio digitizer, video digitizer, modem, or other peripheral without constantly pulling out cables. While you are setting up your studio, beware of careless speaker placement. Speakers radiate killer magnetic fields and should not reside next to disks or drives.

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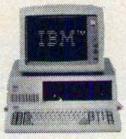

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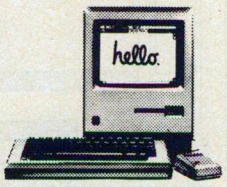

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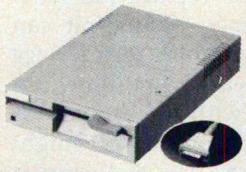

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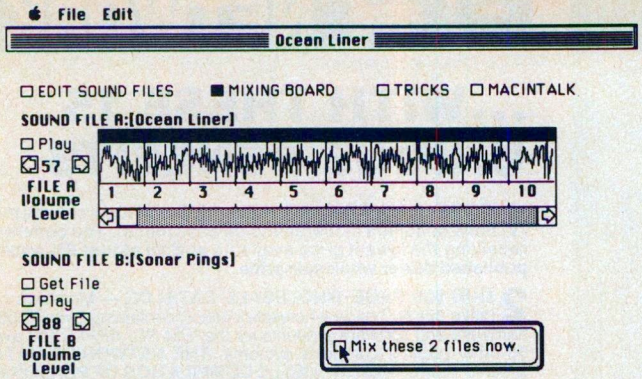

Figure 5: The Ocean Liner sound file has already been opened and loaded in Natural Sound. The Sonar Ping sound is now being shown above, and a click on the Mix button will start the process. The program saves the mixed sounds into a mixed file.

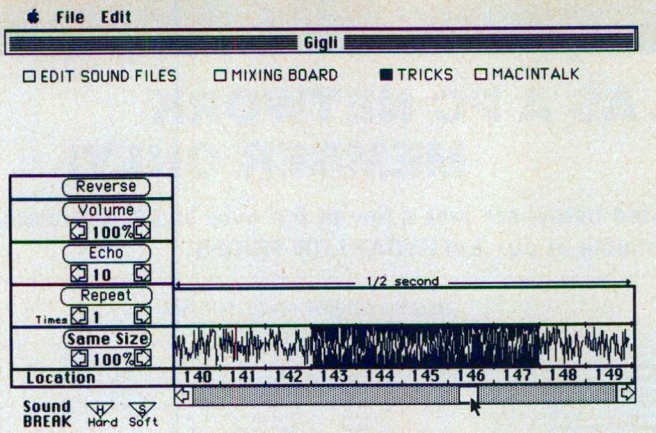

Figure 6: The sound of a Large Crowd has been opened and loaded in Natural Sound and is now available for modifications.

that you can access on the Mac screen, enter it into a MacPaint file, and then link it to other images in controlled, timed sequences—just like a slide show.

With sound digitizing now a simple, inexpensive reality, computer voice recognition is 'more than halfway there.'

Creating and manipulating digital sound with Natural Sound is in many ways similar to that method of using SoundCap, and the same principles apply. Instead of a single screen, Natural Sound uses four, based on the same formats as those that underlie Slide Show Magician. Edit Sound Files shows the recorded sound along a horizontal, scrollable window with location numbers at the bottom of the screen (see figure 4). Level bars at each increment can raise or lower the volume of the sound at that segment. You initiate recording commands by clicking buttons, and the recording levels of the incoming sound are controlled by software, rather than by a knob.

Natural Sound's mixing-board screen has the sound window at the top, and two control panels at the left control the tracks (see figure 5). The Tricks screen has controls that let you manipulate the sound with volume, reverberation, echo, playback repetition, expansion, and compression (see figure 6). When you capture sound, open and load files, and mix and manipulate sound, a gray bar at the bottom—like a thermometer—indicates the rate of action and the amount that has occurred.

The Macintalk screen hosts Apple Computer's licensed speech-synthesis program. In the foreground window, you type in the lines you want spoken and then initiate Convert from the menu. In the background window, the lines appear in the phonetic alphabet. When you click on or type the command Say, the lines are audibly generated. The words you hear are only marginally comprehensible. If you're expecting HAL or C3P0, think more in terms of R2D2. You can edit the phonetic screen, using principles outlined in the documentation. With concentration and a lot of trial and error, you can smooth out the words and deweird the intonations—if you have the ear for it.

Why sound like a wind-up toy when you can use a sound digitizer for much more realistic voice reproduction? Because when the memory chips are down, Macintalk comes out the winner. Sentences such as "Did we back up that file?" can demand more than 36K when you digitize them. In Macintalk, however, even a long paragraph for an instructional program burns up only 1K!

We always knew the Mac was more than a pretty face; now it can talk and sing as well.

Comparing the Two Systems

To test out these digitizers, I used four kinds of sounds: my voice saying, "The sound goes round and round"; live acoustical music with harpist Cathleen O'Connell playing a wire-strung Celtic harp; opera, with Beniamino Gigli singing on an early 78rpm record; and contemporary rock with The Residents from their *Duck Stab!* album.

In playback, the two products' similarities were more notable than their differences. Above all, I had the pleasure and satisfaction of—at last!—hearing sounds like this come from my Mac. Although fidelity was limited, even the scratches and pops from Gigli's ancient 78 and the bell-like resonance of O'Connell's harp were clear and unmistakable. The Residents sounded right at home in a computer. When I compared the effects processing, the SoundCap files tended to be more precise and clear.

The central factors with two systems such as these are ease of use and end-product applications. Natural Sound's mixing function was more responsive in previewing files, but, in most other aspects, SoundCap was by far faster, more direct, and a completely finished program. I preferred SoundCap's hardware/software monitoring controls, and editing its larger waveform was easier.

Once you have these great sounds, where do you go with them? Unlike Apple's MacPaint, whose

standard graphic interface has encouraged the development of many kinds of compatible programs, there is no standard for sound samples. The Clipboard is helpful only for cutting and pasting within each application. You can't play one product's files on the other.

Each system provides player utilities permitting files to stand alone, independent of the program disk, but in order to use sound in interactively creative ways, at present you have to confine yourself to the VideoWorks and Slide Show Magician programs. Fortunately, these two programs are two of the best motion-design products running on the Mac. VideoWorks (see "VideoWorks," *A+*, August 1985, pages 107–120 and "Presentations with Personality," February 1985, pages 26–33) is capable of true animation as well as slide-show types of sequencing. It can accept melodies from MusicWorks as well as SoundCap and Macintalk files. Slide Show Magician is easier to use for designing simple sequences quickly. Whereas the VideoWorks' playback speed is variable, Slide Show Magician's timing is good enough to use for cuing and rehearsing.

These sounds are just previews of things to come for the Mac. With sound digitizing now a simple, inexpensive reality, computer voice recognition is "more than halfway there." The MIDI interface is available for Mac music makers (see "Midi for the Macintosh" by Freff, February 1986, pages 116–122), and more sophisticated programs are on the way. We always knew the Mac was more than a pretty face; now it can talk and sing as well. ✚

Anthony Reveaux is editor of Computer Publicity News *and lectures in film history at Sonoma State University. He reviews video and performance for* Artweek *and designs and produces slide projections for performance, dance, theater, and opera.*

PRODUCT INFORMATION

SoundCap and MacNifty Audio Digitizer
MacNifty Central
6860 Shingle Creek Parkway, Suite 110
Minneapolis, MN 55445
(800) 328-0184
List Price: SoundCap and MacNifty Audio Digitizer, $129.95; MacNifty Stereo Music System, $79.95; MacNifty Switch A–B, $34.95; MacNifty Switch A–B–C–D, $54.95; Power Adapter for Macintosh Plus, $19.95
Requires: Macintosh (SoundCap and MacNifty Audio Digitizer require at least 512K RAM and an external disk drive; hard disk recommended)
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Chatsworth, CA 91311
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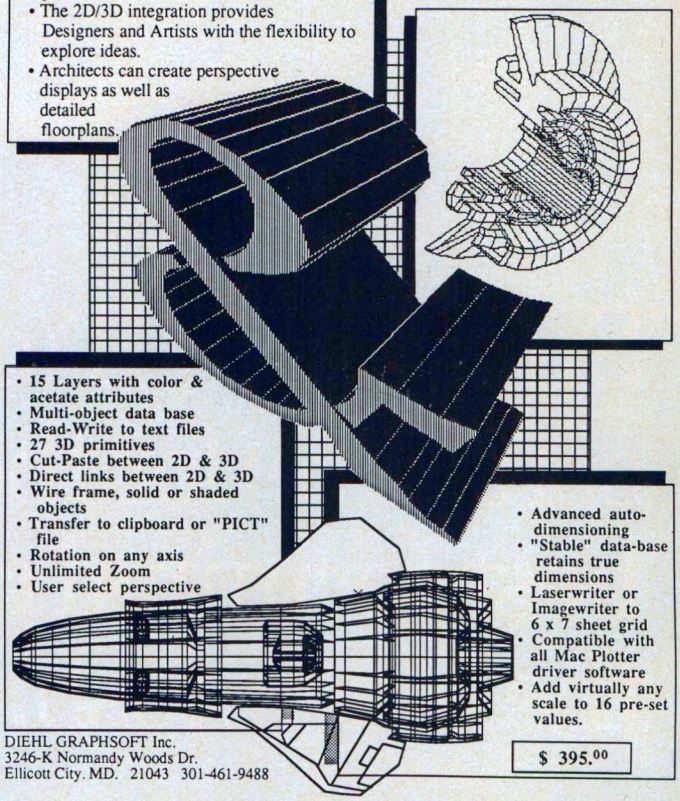

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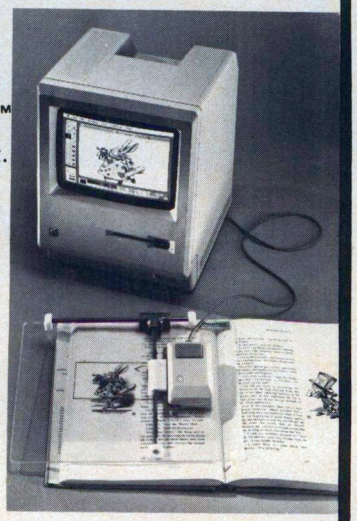

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InTeRlAcE

Singular Software takes you on a roller-coaster ride with its powerful new relational-database program for the Macintosh

BY SHARON ZARDETTO AKER

Can there possibly be room for another Macintosh database program? Singular Software thinks so and has released Interlace, a relational "information manager."

Getting started with Interlace is a little like riding a roller coaster. You start right at a peak: Wow—the relations show right on the screen, a basic data file is a cinch to set up, and the documentation is so clear! Then it's a quick ride downhill as you try to design reports or set up related files and the manual loses its clarity. Next, it's up to another peak as you work with the program and discover all its power. After that, it's back down again when you realize that you've traded in some ease of use for that power and that you have to settle for a user interface that's less than intuitive—graphic display of relational files notwithstanding. Finally, the ride smooths out at a pretty high level, but considerably below the early peaks.

The Relational Advantage

If you're unfamiliar with the concept of a relational database as opposed to a standard database, consider this scenario: You run a videotape-rental business and you need to keep track of your club members (names, addresses, member number, membership status, and so on) as well as your library of tapes. It doesn't make any sense to do that in one data file, but having separate files means you have to make entries into both to keep track of which members have which tapes.

With a relational system, you can link the essentially separate member and tape files so that entries in one file are reflected in the appropriate record in the other file.

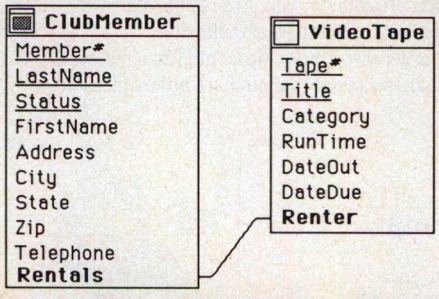


Figure 1: Field names in the file image are underlined if they are Key fields, and they appear in boldface when they serve as links to a related file.

Interlace Data Files

To set up a basic database in Interlace, you design a "file image" consisting of the files that you want, along with their definitions—text, numeric, and so on. Each file must contain at least one key field that defines each record as being unique from the other records in the file. This is the definition of *key field* in the manual's tutorial; only key-field data appears in the records of the linked data file, so to get more information to show up in the linked file, you have to create multiple key fields in each file. The file image, an element separate from the data file itself, appears on the screen with a title bar, a status icon, and a list of the fields. The status icon indicates whether or not the file design has been saved and if the data file is open. The field names in the image are underlined if they are key fields, and they appear in boldface when they serve as links to a related file (see figure 1).

To link two files, all you have to do is draw a line from a field in one file image to a field in another image. You can designate the link as a single or multiple link by making a simple menu selection. In the videotape-rental business, for instance, a tape can be checked out to only one per-

son at a time, so the link from Tapes to Members is a single link. A member can take out more than one tape at a time, though, so the link from Members to Tapes is a multiple one, a "collection of links," in Interlace terminology. The program provides no visual clue to indicate whether the link is single or multiple, however; you have to select the linked field and look in the appropriate menu to see which item is checked.

At data-entry time, you double-click on the title bar of the file image to open the file itself. You can set up the data-entry window in any way you want by switching to the Design mode. Fields are resizable, and you move them around by dragging. Additional labels can go anywhere within the window, and you can set labels and field data separately to any available font or size.

You can look through an Interlace file by browsing forward or backward a record at a time or by searching for specific records with a query that can range from a simple Match command to a complex set of criteria. If you want to see a list of records on-screen or in print, however, you have to design a report. A database report generally has some overall summation of record data, including cross-record sums and other calculations; even though such calculations are an Interlace strong point, it takes a while to get used to the fact that designing a report is the only way you can see or print multiple records in Interlace—even if it's just for mailing labels.

To design a report, you select the file from which the report is going to draw its information and which fields in that file you want to see. You can then choose to work with all the records in that file or only those that meet certain criteria (see figure 2).

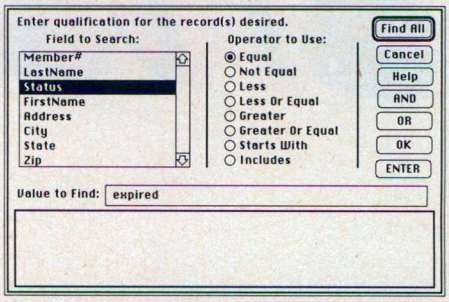


Figure 2: When designing a report, you can choose to work with all the records in a file or only those meeting certain criteria.

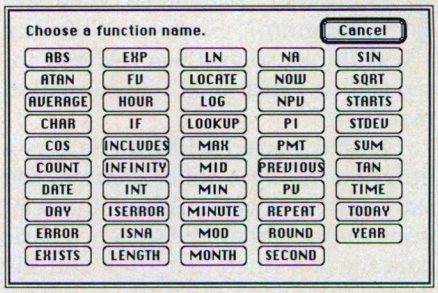
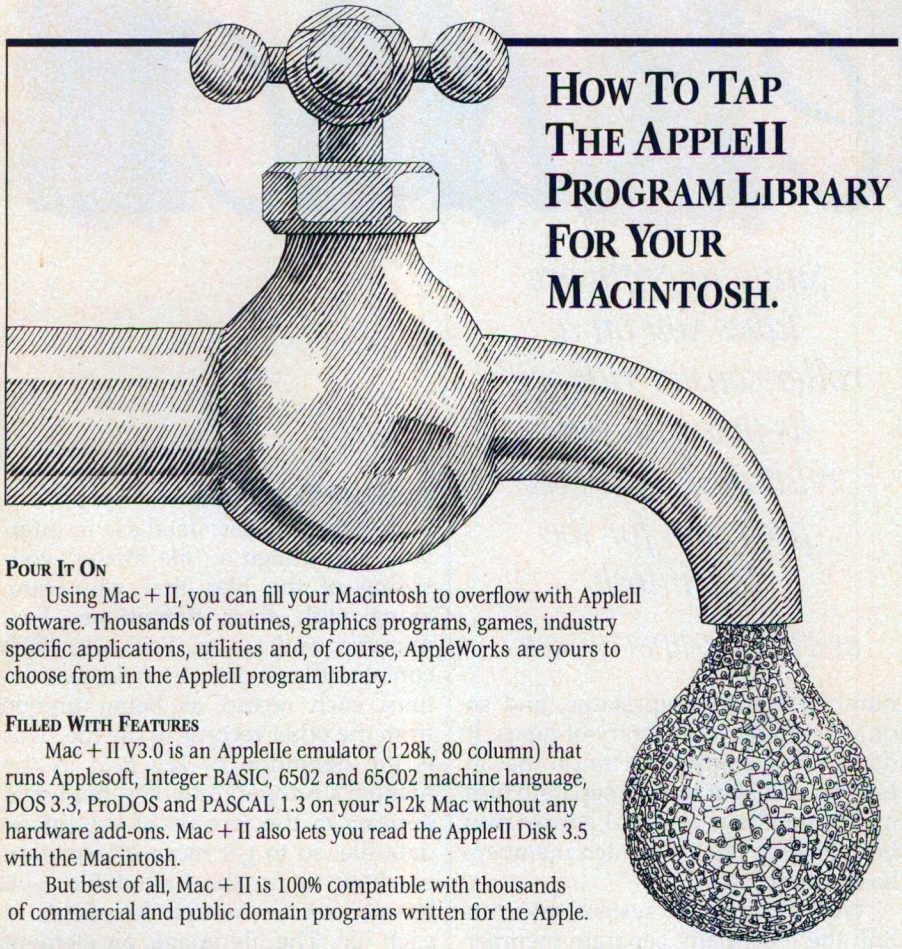


Figure 3: You can choose from 49 functions in a calculated field.

Viewing records is one of the low points on the Interlace roller-coaster ride. You have to design something called a Repeating Collection to be able to do so. It is just an arrangement of the information from the file you've designated as the Source, but the terminology and design interface are very confusing at this point. The process gets worse if you're trying to make a list from a file that is linked to another, because the link field does not appear on the list of available fields for the report. What you have to do is create another Repeating Collection inside the first and name the link field as the Source for the fields inside the nested Collection. Sound



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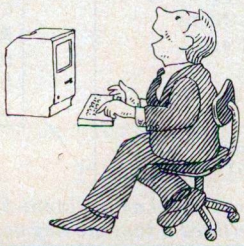

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CIRCLE 170 ON READER SERVICE CARD

confusing? It is. Still, practice makes anything easier—although a procedure like this might grow more annoying even as it got more familiar.

A calculated field is available only as a specially created field when you are in the Report mode, but the available calculations are terrific. You can choose from 49 functions, in addition to the basic mathemetical operators; they include trigonometric, financial, statistical, and string functions that you would normally find in a spreadsheet. Some special functions are particularly useful for certain reports; Previous, for instance, adds the field in the current record to the running total of that field in previous records (see figure 3).

Amount	$150,000.00
Rate	15.00%
Years	30
Yearly Payments	$22,845.03
Total	$685,350.89

LOAN PAYMENT CALCULATOR

Amount	$150,000.00
Rate	15.00%
Years	30
Yearly Payments	$22,845.03
Total Payments	$685,350.89

Figure 4: Data a report generates can be saved in a format that many programs can read as a data file, in text format, or in the special text format that works with Microsoft Word's Merge feature.

The data a report generates can be saved in a format that many programs can then read as another data file, in a text format for use with other programs, or in the special text format that works with Microsoft Word's Merge feature (see figure 4).

Power Worth the Puzzle

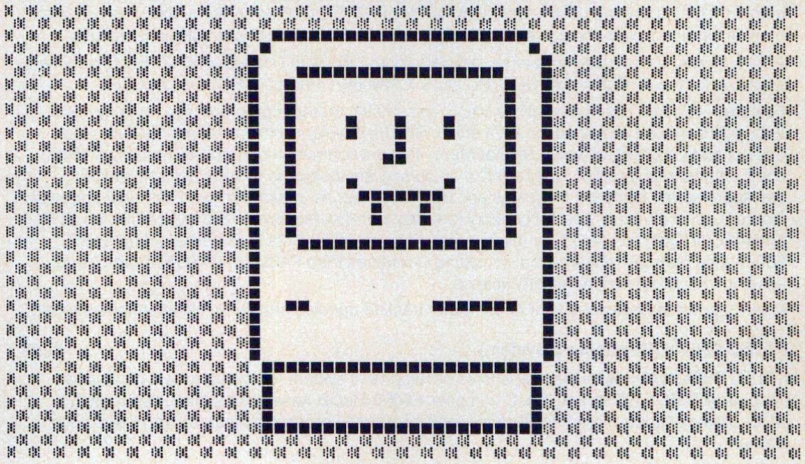
Interlace gives you a lot of freedom in report design; you can even import graphics as enhancements or backgrounds for forms. For printing, you can specify page breaks, headers, and footers and designate certain areas (such as the contents of a single record) to be unbreakable across pages.

Interlace's copy-protection scheme is the usual "key disk" scheme with a twist that makes it more palatable than the standard: The system asks you for the key disk only every two weeks, regardless of the number of times you've used Interlace in the interim. Using Interlace on the Hard Disk 20 with the hierarchical filing system is no problem, as long as you keep related files in the same folder—a constraint you'll hardly notice because you'll probably organize the files that way in any case.

The manual is a disappointment. It starts out wonderfully but then presents new and awkward terminology too quickly. The more powerful features of Interlace don't appear in a tutorial section at all; they are scattered in the "Details and Techniques" and reference sections. As you thumb through "Details" and see a description of how to write a formula to break down a name in a single field into separate First Name/Last Name fields, you realize it's going to be worthwhile to learn your way around Interlace's special features.

Interlace has many smaller touch-

Levco
MonsterMac



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CIRCLE 212 ON READER SERVICE CARD

The C for the Macintosh and Apple II

FOR THE MACINTOSH

AZTEC C68k is the most powerful, portable, and professional C compiler and software development system for the Apple Macintosh. It is available in three configurations.

AZTEC C68k-c (Commercial System) $499

For serious Macintosh developers who want to program in C there is no parallel to AZTEC C68k-c. AZTEC C68k-c produces smaller and faster code in less time than any system benchmarked. The supporting utilities and commands of AZTEC C68k-c create a Macintosh development environment with the power and flexibility needed for producing professional results.

All C features are faithfully supported providing portability with UNIX C and AZTEC C compilers available for the APPLE II, MS DOS, PC DOS, CP/M-86, CP/M-80, TRSDOS, and C64.

Features include: C compiler, 68000 Macro Assembler, modular programming, overlay linker, debuggers, mouse based editor, Z(Vi) editor, SHELL development environment (UNIX was developed to support software development - this environment incorporates the best of UNIX), comprehensive support of the Macintosh including the toolbox to provide straight forward development of Macintosh programs and desk accessories, make, diff, grep, terminal emulator (source), grow (source), desk accessory (source), ramdisk (source), UNIX I/O, MATH, UTILITY, and MACINTOSH run time libraries (source), full support for 512k Mac and Lisa Macworks, 600+ page manual, resource maker, calling C routines from PASCAL, PASCAL from C, and assembler subroutines, no-royalty license.

Manx support includes one year of computer tracked updates and technical telephone support.

AZTEC C68k-d (Developer's System) $299

AZTEC C68k-d provides a less expensive development system for programmers on limited budgets. AZTEC C68k-d includes C compiler, 68000 Macro Assembler, Linker, debuggers, editor, toolbox support, run time libraries (object), sample programs (source), and a 600 page manual.

AZTEC C68k-p (Personal System) $199

For students and professionals doing serious non-commercial work. Includes C compiler, Linker, run time libraries, sample programs (source), debugger, and editor. Restricted license.

C-TREE Database (Aztec object format) $149

C-TREE Database (Object + Source) $390

FOR THE APPLE II

AZTEC C65/DEV (Developer's System) $299

This C compiler and software development system comes with C compiler, 6502 assembler, SHELL, overlay linker, UNIX I/O, Screen, and Graphics libraries, editor, utilities, and support for ProDos.

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CIRCLE 189 ON READER SERVICE CARD

Discovering the special features as well as the lapses in design is part of the roller-coaster ride.

es that make databasing easier, yet it is missing a lot of minor elements that would serve the same purpose. Among the special features are sequence fields: You can fill in any value in one record, and all other records in that field will be incremented by 1. You can "qualify" any field so it accepts numbers or dates only within certain ranges. Yet, you can enter dates only in a month/day/year format, even though you can display them in different ways. Time fields show hours/minutes/seconds, and you can't chop off the seconds. Discovering these special features as well as the lapses in design is part of the roller-coaster ride of satisfaction and frustration.

Singular Software is starting a newsletter, free to registered users, that will describe some of Interlace's features in more detail. In the meantime, help is only a phone call away. I couldn't find any mention of an official phone-support policy, but I called several times for help with the databases I was designing to test the program and always got the answers I needed right away. (In case you're wondering, I called as a regular user—the help I got wasn't special treatment for a reviewer.) A Help feature, built right into the program, is thorough in scope but not overly helpful when you're still in the learning stage—it works better as a memory-nudger when a procedure has slipped your mind.

All in all, the product is very good as it stands, but one reason for getting it right now—besides the power for the price—is that you can learn your way around it before the inevitable update comes along. +

PRODUCT INFORMATION

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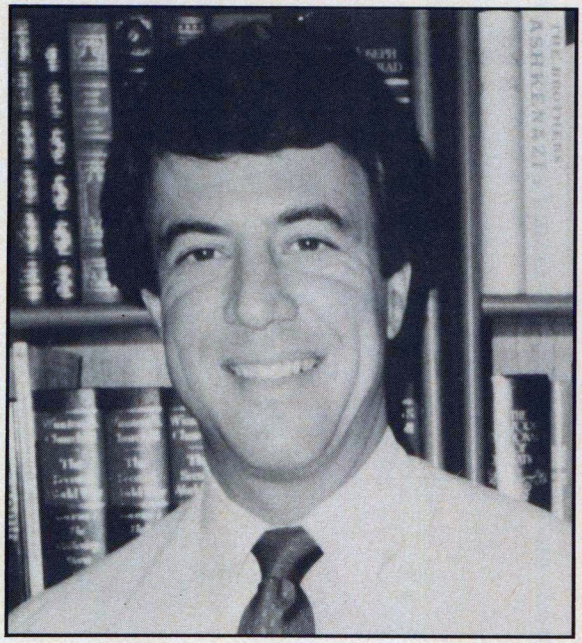
List Price: $95

CIRCLE 452 ON READER SERVICE CARD

MEET DR. CHARLES JAFFE, M.D., THE WINNER OF THE *1986* A+ READERS' CHOICE AWARDS MACINTOSH COMPUTER

Dr. Charles Jaffe, an asthma specialist in Napa, California, is this year's winner of the *A+ Readers' Choice Awards* Macintosh computer. His entry was selected, in a random drawing held in January 1986, from over 10,000 received.



Dr. Jaffe currently uses an Apple *II*e in the office for all of his business and professional applications. "We do everything with it. Word processing, billing, communicating with MedCom (an on-line medical database) and now, we've just connected our office with an index library to research the contents of current medical literature. The Macintosh will make a great addition to our office."

Dr. Jaffe also uses an Apple *II*e at home for personal financial management and educational and scientific programs for his children. "Of course, we use it for entertainment too," he added.

A subscriber to A+ since the first issue, Dr. Jaffe said "Of all the Apple magazines on the market, I think A+ is the best. It's the most readable, and I find useful new applications every issue. A+ is my most important Apple reading, and now, with my new Macintosh, the Macintosh Section will prove to be extremely important to me."

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CIRCLE 101 ON READER SERVICE CARD

MacTips

Suggestions from our readers

FOLDERS SHORTCUT

With the new hierarchical file system (HFS) on the Mac Plus or with the new ROM upgrade, and with System file version 3.0 or greater, you can conveniently store documents in folders, within folders, within folders. . . Although the system helps you neatly categorize and organize your documents, when you open a document from within an application, you have to find your folder, double-click on it or open it, find the next folder, double-click or open it, and so on, until you find your document. If you know exactly where your document is, however, you can take a shortcut.

For example, if your letter named MacTip is in a folder named Letters to Write, and it is in a folder called Word Processing, you can quickly open MacTip as follows: in the dialog box that you see when you select Open from the File menu from within an application, type enough of the folder's name, Word Processing, to distinguish it from any other name; then press the Enter key (which opens the folder), type enough of the Letters to Write folder's name to identify it, press the Enter key, type enough of the document's name to identify it, and press the Return key.

Chris Espinosa
Apple Developers' Conference
January 1986

PRINTING A FULL PAGE

If what you're printing goes all the way to the bottom of the page, the ImageWriter may scroll a blank sheet through the machine. In order to avoid this problem, fill in the beginning and ending page numbers in the From and To boxes in the Print dialog box. Do so even if the numbers are 1 and 1.

Philip C. Russell
Waldport, OR

ATTACHED DISKS

Here's a nifty trick for making application disks, such as MacPaint and MacWrite disks, more readily available to students who are using Macs in a classroom situation.

First of all, drill a very small hole in the upper left corner of the disks you want to use, just opposite the write-protect tab. Then tie one end of a short piece of fishing line through the hole you have made in each of the disks. After that, tie the other end of each fishing line through a pair of ventilation slots on the right side of the machine or through the hole in the metal security attachment at the back of the Mac.

Attaching the disks to your Macs in this way will save you lots of time in having to check them out to students and will prevent students from accidentally walking off with them.

John S. Lakotos
American School of Lima
Lima, Peru

UNIDISK 3.5 DRIVES WITH THE MACINTOSH

You can use Apple's UniDisk 3.5 disk drives with the Macintosh. First make sure you're using Macintosh software that works with the 800K double-sided disk drives and uses the hierarchical file system (HFS). You also need the HD20 System file with Finder 4.6 or greater or a Macintosh Plus. Simply disconnect the cable from the upper board and reconnect it on the lower board (see figure 1). The only limitation is that you cannot boot (start) the Macintosh with this disk drive.

The Editors

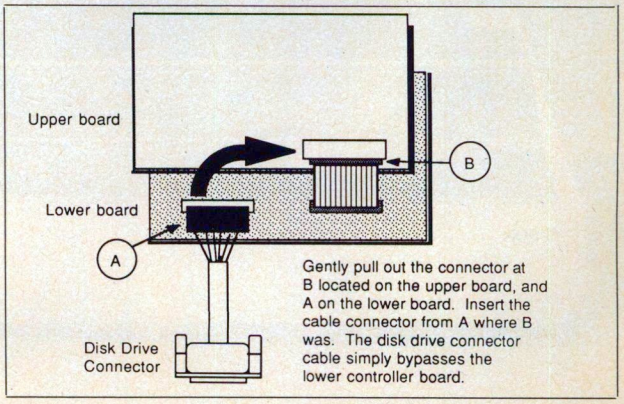


Figure 1: Changing the cables on the UniDisk 3.5

FINDER AS APPLICATION

You have probably heard that you can run the Finder by pressing the Option and ⌘ keys and then double-clicking on Finder. If you just want to start the Finder like any other application, you can change the Finder's file type from FNDR to APPL with Apple's Resedit, John Mitchell's Fedit, Central Point's MacTools, or other utilities that allow you to change the file type.

The Editors

MAKING T-SHIRTS AND SILK SCREENS

You don't have to spend money on special transfer ribbons if you just want to make one or two T-shirts. A brand-new, standard ImageWriter ribbon works almost as well as the special transfer ribbons. Just place the ink side of the paper against the cloth and use a hot iron to transfer the ink.

If you want an inexpensive way to make many copies of the Mac's output, read a few books on silk-screening and look at the sections on stencil cutting and photo-stencil methods. A good book is *The Complete Book of Silk Screen Printing Production*, by J.I. Biegeleisen. It costs $4.50 from Dover Publications, Inc., 180 Varick Street, New York, NY 10014.

David Smith
Mendham, NJ

Pipeline

EPSON FX-286 PRINTER

A replacement for Epson's FX-185, the FX-286 is a high-quality 136-column dot-matrix printer that can emulate the IBM Proprinter. Its 9-wire printhead produces both 9 × 9-dot draft-quality printing at 200 cps and 18 × 18-dot near-letter-quality printing at 40 cps. The printer can output text in six character pitches, and users can choose from more than 160 typestyles available on the SelecType control panel. It also has a built-in 8K buffer, optionally expandable to 32K, and full graphics capability, including downloadable graphics character sets and user-definable characters. The FX-286 comes with both friction and tractor paper feed; a serial-interface board and a cut-sheet paper feeder are available as options. *(List Price: $749)*

Epson America, Inc.
2780 Lomita Blvd.
Torrance, CA 90505
(800) 421-5426
In CA (213) 539-9140

CIRCLE READER SERVICE NO. **500**

The MultiScribe word processor offers Macintosh-like features for Apple IIe and IIc users.

MULTISCRIBE

MultiScribe is a word-processing program for Apple IIe and IIc computers that offers users most of the advanced features of Macintosh word processors, including pull-down menus, scroll bars, and dialog boxes. Users can either use the AppleMouse, a "keyboard mouse," or the open-apple control key to select commands. A variety of fonts in different styles and sizes are available, and they appear on-screen as they will be when printed. In addition, using the program's Font Editor, users can create fonts, symbols, borders, and pictures and print them in their documents. Other features include cut, copy, and paste functions; Find and Replace; Invert Screen; and Print Merge. *(List Price: $39.95)*

Requires: Apple IIe or IIc

StyleWare, Inc.
6427 Hillcroft, Suite 201
Houston, TX 77081
(800) 233-4088
In TX (713) 771-4627

CIRCLE READER SERVICE NO. **501**

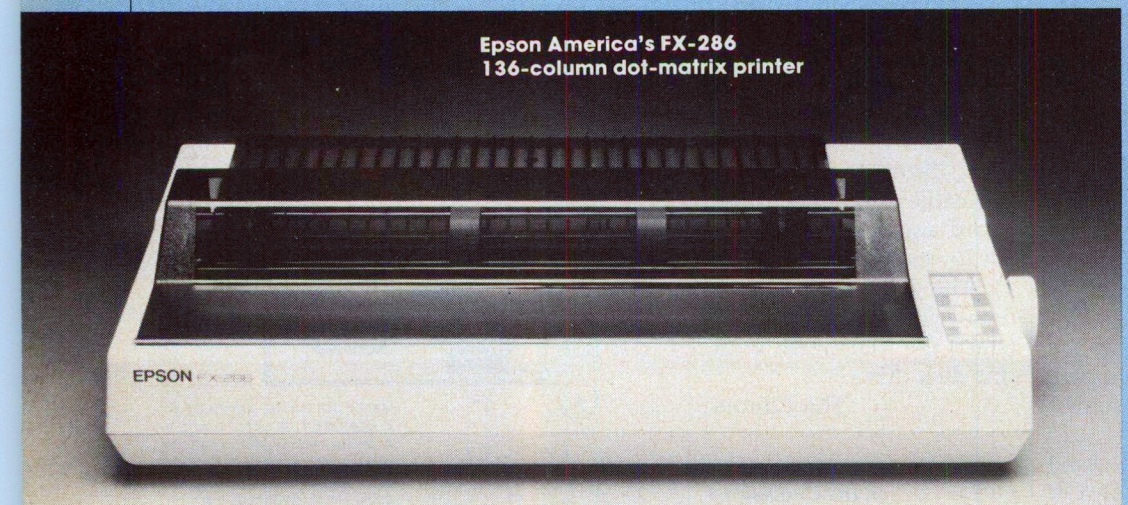
MAKE ANOTHER COPY (M.A.C.)

Make Another Copy (M.A.C.) is a replicating device that slips over a mouse to provide a pantographic system for transferring artwork onto the computer screen. You use a pointer/stylus to trace artwork or draw freehand, and M.A.C. moves the mouse simultaneously to produce a copy on-screen. By changing the position of two wing nuts, you can change the size of the image, enlarging, reducing, or retaining the original artwork size to fit the screen. *(List Price: $49.95)*

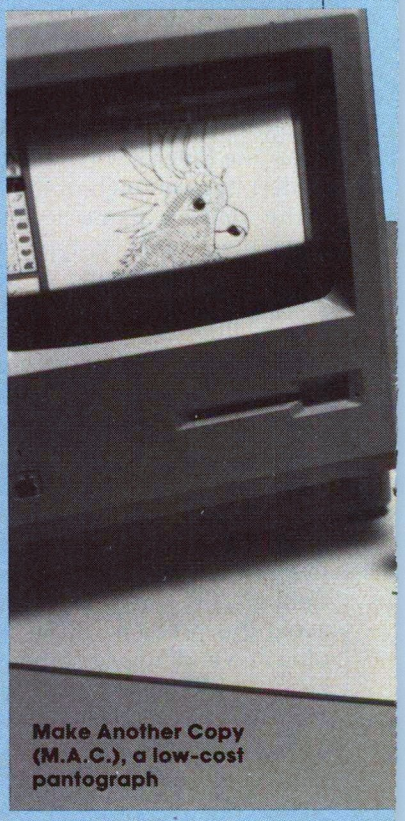
Requires: Apple IIe, IIc, or Macintosh

Innovative Products
P.O. Box 1233
Oak Brook, IL 60522-1233

CIRCLE READER SERVICE NO. **502**



Epson America's FX-286 136-column dot-matrix printer



Make Another Copy (M.A.C.), a low-cost pantograph

MAC

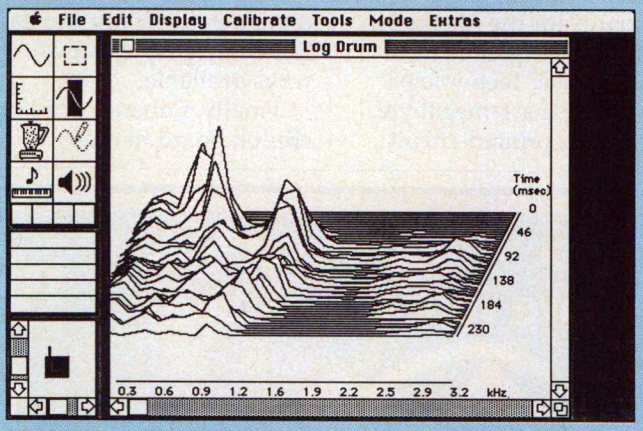
SOUND DESIGNER 2000

Sound Designer 2000 is an advanced computer-music system that allows users to transfer sampled sounds at twice the normal MIDI data rate between the Macintosh and the Sequential Prophet 2000 keyboard using a standard MIDI interface. Users are able to display up to three waveforms on-screen simultaneously, magnify the display, scroll it, and edit the waveforms. The system also includes a variety of digital signal-processing functions for modifying sample sounds or creating new sounds, visual looping aids, and graphic programming aids for programming all Prophet 2000 parameters. *(List Price: $495)*

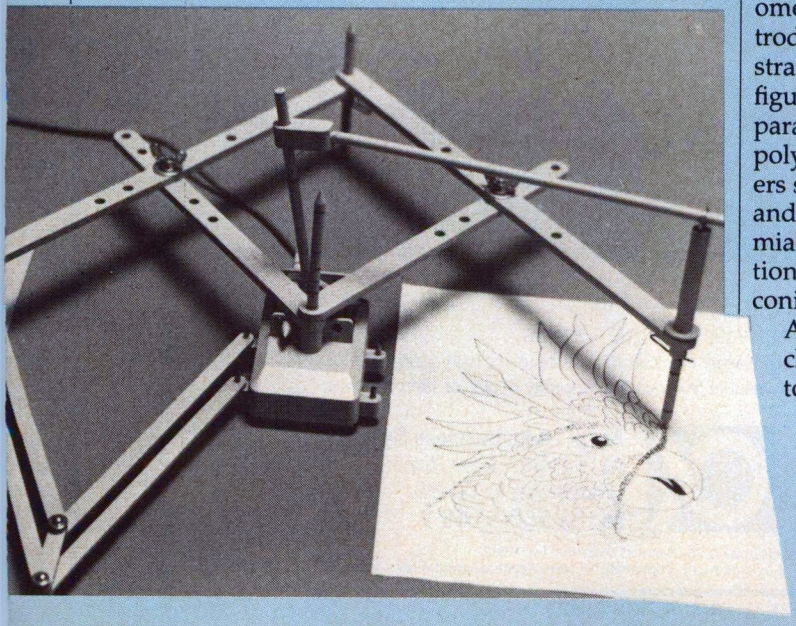
Requires: Macintosh, Sequential Prophet 2000

Digidesign, Inc.
920 Commercial
Palo Alto, CA 94303
(415) 494-8811

CIRCLE READER SERVICE NO. **503**



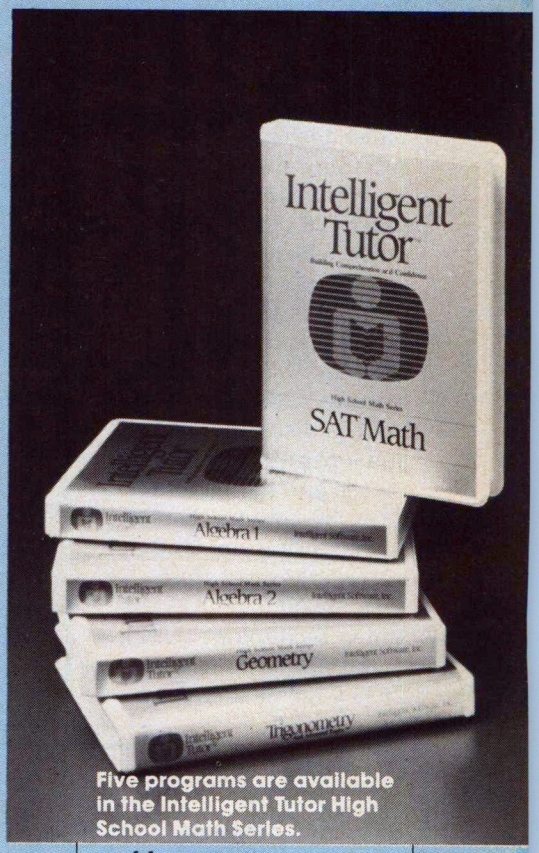
Sound Designer 2000 is an advanced computer-music system from Digidesign, Inc.



II SERIES

INTELLIGENT TUTOR HIGH SCHOOL MATH SERIES

Five packages in the Intelligent Tutor High School Math Series are now available—Algebra 1, Geometry, Algebra 2, Trigonometry and Advanced Topics, and SAT Math. All programs offer two modes for use: a Test mode in which students take a sample test and can then view an analysis of their performance and a Practice mode in which they can practice problems and then choose to see an explanation of the solutions, redo the problems, or try others.



Five programs are available in the Intelligent Tutor High School Math Series.

Subject areas of Algebra 1 are a review of arithmetic, simple and advanced algebraic operations, and functions and miscellaneous topics. Geometry skill areas are introductory material and straight-line figures and figures involving triangles, parallels, and circles and polygons. Algebra 2 covers systems of equations and determinants, polynomials and rational functions, and functions and conics. Trigonometry and Advanced Topics includes an introduction to trigonometry, advanced trigonometry, complex numbers and vectors, and probability and statistics. Skill areas in these programs are further subdivided into 36 problem areas.

SAT Math helps students improve their skills in the areas of decimals, averages, and fractions; units of measure; ratios, proportions, and graphs; algebra; geometry; functions and advanced topics; qualitative and quantitative comparisons; and logic and word problems. These areas are subdivided into 35 subject areas. SAT Math also gives an estimate of a student's equivalent SAT score and offers both timed and untimed tests. *(List Price: SAT Math, $69.95; other programs; $49.95 each)*

Requires: Apple II, II Plus, or IIe

Intelligent Software, Inc.
9609 Cypress
Munster, IN 46321
(219) 923-6166

CIRCLE READER SERVICE NO. **504**

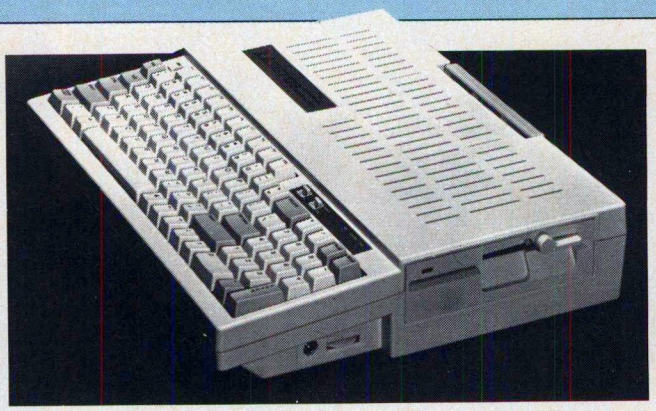
HARDWARE

LASER 128 COMPUTER

Video Technology (U.S.) and Central Point Software have introduced the Laser 128 personal computer, which is compatible with Apple IIe and IIc computers and can run nearly all popular Apple software. The computer features 128K RAM, a built-in disk drive, a serial and a parallel interface, mouse and modem interfaces, 80-column display, an expansion slot, and a numeric keypad. *(List Price: $479)*

Video Technology (U.S.), Inc.
2633 Greenleaf Avenue
Elk Grove Village, IL 60007
(312) 640-1776
or
Central Point Software, Inc.
9700 S.W. Capitol Highway
Suite 100
Portland, OR 97219-9990
(503) 244-5782

CIRCLE READER SERVICE NO. **505**



The Laser 128 personal computer runs IIe and IIc software.

SUPERMAC ENHANCEMENT BOARDS

Three new upgrade boards for the Macintosh are now available from SuperMac Technology.

Meg is a 1-megabyte, flexible, printed-circuit board that fits under the RAM array, enabling it to coexist with internal hard disks. For users who don't require internal hard-disk compatibility, the company also offers Meg-d.

Compatible with the Meg, SuperDrive 20 is a high-performance 20-megabyte 3½-inch internal hard disk. SuperDrive bypasses the computer's serial I/O ports to provide disk file access up to three times faster than do external drives. In addition, the product runs under Apple's new hierarchical file system so that it does not require partitioning and its full 20 megabytes are always available.

Finally, Enhance is a clip-on board that up-

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Locksmith, the controversial copy program that took the Apple world by storm in 1981, has evolved from a powerful bit-copy programmed into a complete disk utility system, allowing the Apple user to recover crashed disks, restore accidentally deleted files, and perform hardware diagnostics on the disk drive and memory boards. The NEW Locksmith version 6.0 is now available and includes an advanced disk recovery utility, a framing-bit analyzer, an automatic boot tracer, a sector editor, many file utilities, and of course, the most powerful bit-copy program available. A fast disk backup utility copies disks in eight seconds flat. Improvements to Locksmith Programming Language have made it more powerful and easier to use for you to write your own backup and repair procedures. Includes a library disk which contains automatic procedures to copy hundreds of Apple programs.

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Alpha Logic Business Systems, Inc.
4119 North Union Road
Woodstock, IL 60098
(815) 568-5166

VISA

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CIRCLE 259 ON READER SERVICE CARD

grades a Macintosh to a Macintosh Plus but gives 2 megabytes of contiguous RAM rather than 1 megabyte. It comes with a Macintosh Plus-compatible (SCSI) port, and because it uses the same SIMM memory modules as the Macintosh Plus does, it can be expanded further to 4 megabytes or more. *(List Price: Meg, $849 for 128K Mac, $699 for 512K Mac; Meg-d, $649 [128K], $499 [512K]; SuperDrive, $1299; Enhance, $1095)*

Requires: Macintosh

SuperMac Technology
1901 Old Middlefield Way
Mountain View, CA 94040
(415) 964-8884

CIRCLE READER SERVICE NO. **506**

MAC

HYPERDRIVE 2000

The Hyperdrive 2000 is a high-performance coprocessor board and internal hard-disk drive that enhance the memory capacity and computational and disk-access speed of Macintosh and Macintosh Plus computers. The Hyperdrive 2000 board replaces the computer's CPU with a 12-MHz 68000 microprocessor that effectively doubles the computer's internal processing speed. HyperDrive 2000 also includes a 20-megabyte internal hard-disk drive, an additional 1.5 megabytes of RAM, and a floating-point 6881 coprocessor for high-speed numerical calculations. *(List Price: $3195)*

Requires: Macintosh or Macintosh Plus

General Computer Corporation
215 First Street
Cambridge, MA 02142
(617) 492-5500

CIRCLE READER SERVICE NO. **507**

II SERIES

FLIPSTER

The Cirtech Flipster is a 1-megabyte RAM card that fits any standard slot in Apple II Plus or IIe computers. By plugging in additional Flipsters, users can increase the computer's memory by up to 6 megabytes. The product is compatible with all ProDOS, DOS 3.3, and Pascal 1.3 software and features a flip flop that lets users zoom between programs or data in various sections of the RAMdisk, even if the sections are under different operating systems. *(List Price: $490)*

Requires: Apple II Plus or IIe

Cirtech (UK) Ltd.
Currie Road Industrial Estate
Galashiels, Selkirkshire
Scotland TD1 2BP
0896- 57790

CIRCLE READER SERVICE NO. **508**

ZVM-1330 COLOR MONITOR

Zenith Data Systems has introduced the ZVM-1330, a compact, ergonomically designed, color video monitor with a 13-inch screen. The display offers 25 lines by 80 characters; a high resolution of 640 × 240 pixels; and 16 colors, including brown. On/off, brightness, and contrast controls are mounted on the front panel, and controls for horizontal and vertical size and centering are provided. The monitor comes with a 9-pin D connector. *(List Price: $649)*

Zenith Data Systems
1000 Milwaukee Avenue
Glenview, Il 60025
(312) 391-8949

CIRCLE READER SERVICE NO. **509**

SOFTWARE

II SERIES

PROFIT PURSUIT

Designed for home and office use, Profit Pursuit is a collection of four menu-driven financial programs on one disk. The first program, Depreciation+, can compute 3-, 5-, and 10-year ACRS depreciations for personal property; 15- and 18-year ACRS depreciations for real estate; and straight-line, sum-of-years-digits, and declining-balance depreciations. Lease Master computes and amortizes leases with multiple advance payments and residual value, and APR! can find the actual percentage rate of loans with prepaid points and fees. Finally, Pricing Master computes the cost, selling price, markup, and margin for retail and wholesale pricing. All four programs enable users to print data screens and results. *(List Price: $39.95)*

Requires: Apple II, II Plus, IIe, IIc, or III; 48K RAM; one disk drive

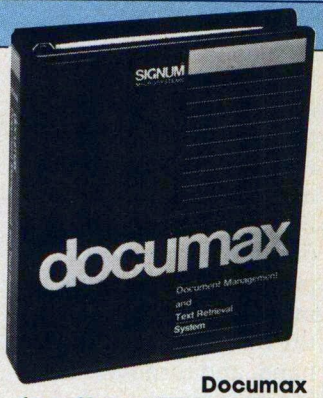
Core Concepts, Inc.
P.O. Box 24157
Tempe, AZ 85282
(602) 968-3756

CIRCLE READER SERVICE NO. **512**

II SERIES

DOCUMAX

A menu-driven text-management program, Documax enables users to perform full-text searches of standard ProDOS text files and to compress text to 50% of its original length. Its text-management and -retrieval component eases text-file organization, allows users to inspect file contents quickly, performs high-speed searches, collects passages of text on any subject automatically and places them into a new file, cuts and pastes across files, and provides basic text-editing facilities. The program's text-compression function both doubles disk-storage capacity and halves the cost of transmitting files over telecommunications lines. *(List Price: $99.95)*



Documax from Signum Microsystems

Requires: Apple IIe or IIc, 128K RAM, ProDOS, one disk drive

Signum Microsystems
120 Mountain Avenue
Bloomfield, CT 06002
(203) 726-1911

CIRCLE READER SERVICE NO. **513**

II SERIES

INVENTORY CONTROL SOFTWARE

Stockfile, Stockmaker, and Macrotary are some of the inventory-control products available from Solidus International.

Stockfile is a total inventory-control system that can keep 3162 individual part numbers on one disk and can keep up to three disks on-line simultaneously to provide a maximum of 9486 part numbers. Each part number can be up to 20 characters long and can be either numeric or alphanumeric. Users can access any part

in two seconds. Inventory data for each part comprises part number, part description, vendor code, manufacturer's part number, unit of measure, date of last issue, unit cost price, unit selling price, minimum quantity, quantity on order, quantity on hand, and turnover. The Stockfile system includes six types of reports, although users can also specify their own.

Designed for use with Stockfile is Stockmaker, a bill-of-materials program that enables users to determine the assemblies in which each component is used, reserve components prior to production, apply the latest cost prices of components, and automatically keep inventory information up to date. The program can handle up to 980 assemblies with up to 90 components per assembly and up to 25,000 components in total. The system permits an unlimited number of production schedules, each one consisting of up to 85 assemblies, and has a variety of ready-made reports.

Macrotory is a universal inventory-control package that can track more than 40,000 part numbers with up to 77 pieces of information about each part. Users can display any part in less than two seconds. Users can set up and display formats and reports by moving information about on the screen until they are satisified with the result. *(List Price: Stockfile, Stockmaker, $475 each; Macrotory, $795)*

Requires: Apple II Plus or IIe, two disk drives, monitor, printer

Solidus International Corporation
215 West Holly
Suite 241
Bellingham, WA 98225
(206) 734-3744

CIRCLE READER SERVICE NO. **514**

MAC

EXPERTELLIGENCE SOFTWARE

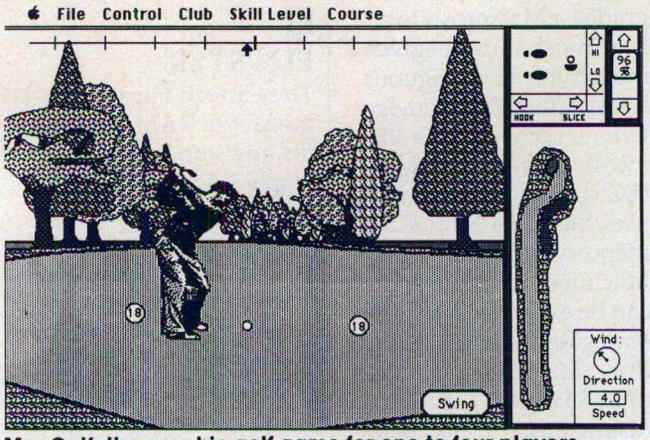
Adding to its family of artificial-intelligence software products, ExperTelligence has released ExperLisp-Talk, software that enables users to integrate real-time speech synthesis into ExperLisp programs.

The company has also released ExperFacts, an expert-system language with which users can create working expert systems. The software provides all features necessary for flexible knowledge-based programming, including backward/forward chaining and meta-level rules. Internal pattern-matching routines let users implement such concepts as recursive code and "frame" representation of the knowledge base. Other features are Caching for speed optimization; Justification for storing processing steps; Knowledge Partitioning; and Software Hooks, a facility to access LISP routines or conventional languages during processing. *(List Price: ExperLisp-Talk, $69.95; ExperFacts, $495)*

Requires: Macintosh, 512K RAM, ExperLisp

ExperTelligence, Inc.
559 San Ysidro Road
Santa Barbara, CA 93108
(800) 235-6965
In CA (800) 824-3349
(805) 969-7874

CIRCLE READER SERVICE NO. **515**



MacGolf, the graphic golf game for one to four players

MAC

MACGOLF

Designed for the Macintosh, the graphic golf game MacGolf keeps scores for one to four players and offers three skill levels—Beginner, Intermediate, and Professional. The screen displays both perspective and aerial views showing trees, fairway, lakes, sand traps, green, rough, and holes for three different 18-hole golf courses. Players have a complete golf-club selection available and can get close-up views of their foot stance, club, and ball for positioning their shots. View indicators show random wind speed and direction. *(List Price: $59.95)*

Requires: Macintosh

Practical Computer Applications, Inc.
1305 Jefferson Highway
Champlin, MN 55316
(612) 427-4789

CIRCLE READER SERVICE NO. **517**

II SERIES

MICROEXPERT

A full, open, and low-cost expert system with the capacity to store and use up to 400 rules, MicroExpert provides users with hands-on experience of expert systems and shows how they can be used to consolidate the problem-solving abilities of one or more experts. For those with no programming experience, MicroExpert explains what kinds of problems expert systems can help solve, how to structure the solution to a problem, how to use the solution to build a knowledge base, and how to use a knowledge base to generate a series of questions to help nonexperts solve the problem.

Experienced programmers can interface the system with existing software or customize it for individual applications. Users can define and call Pascal procedures and functions from within the rules in the knowledge base and so create and use their own library of useful Pascal functions. *(List Price: $49.95)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; 80-column display; one disk drive—or Macintosh, one disk drive

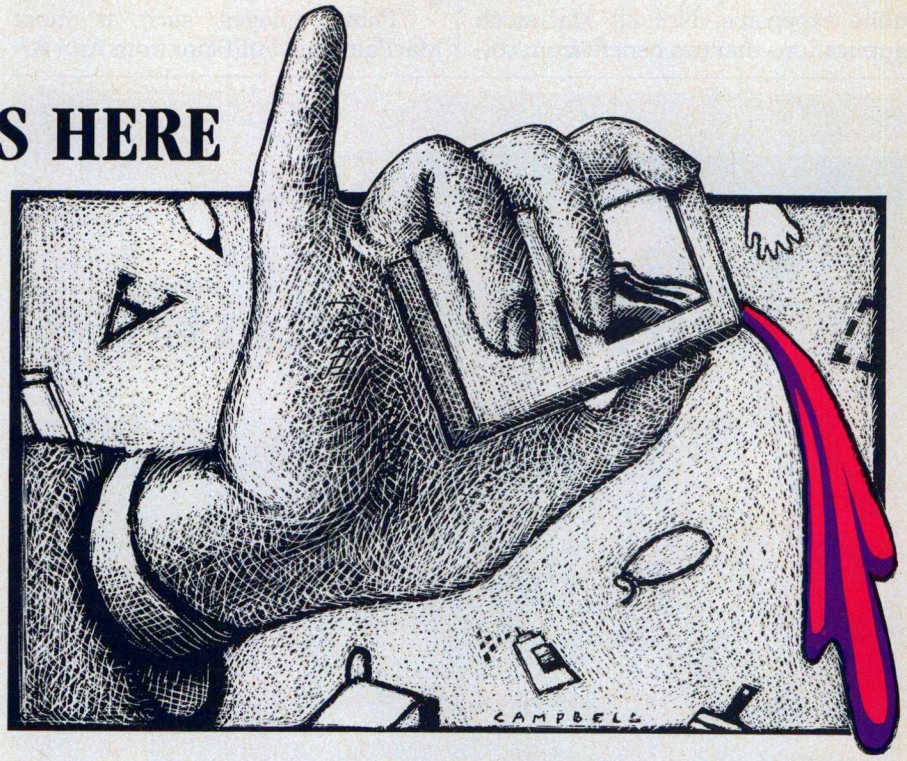
McGraw-Hill Book Company
1221 Avenue of the Americas
New York, NY 10020
(212) 512-3493

CIRCLE READER SERVICE NO. **518**

BY STEVE ROSENTHAL

THE COLOR MACINTOSH IS HERE

A multihued world awaits behind your monochrome screen



If you want a color Macintosh, you don't have to wait for an announcement from Apple. Other firms now offer color input, color software, and color output—all compatible with the Macintosh's quintessential mouse-and-windows approach. You can use a Mac to create a color world, even though you'll see it in monochrome on the Mac's own screen.

Apple, of course, originally intended to make a color Macintosh at some unspecified point and may still do so sometime in the future. Right now, however, the company seems undecided about offering a color model very soon. You get different answers, depending on which spokespeople you ask and what day you ask them.

Fortunately, although the Mac, as Apple currently defines it, doesn't directly display color, it does offer enough hooks to let other firms produce multihued output. The Macintosh's built-in ROM routines include subroutines that will control color when it becomes available, and many system programs, such as the Finder, either include color values or won't interfere with them. Thus, you can get color out of your Mac without having to start out in a completely color-blind world.

Depending on exactly what capability you want, "colorizing" a Macintosh can cost from a few hundred dollars for software and cables to $20,000 for a complete system suitable for color animation or technical graphics. Several of the more expensive systems can be shared, though, so you can spread the investment out over several users or a medium-size department.

Born in Black and White

If Apple always intended that a color Macintosh would eventually exist, why, you might reasonably ask, have we gone this far with black and white? If Apple could already produce color on the Apple II, why not on the Lisa or the Macintosh?

Presentation graphics and desktop publishing have become major Macintosh applications.

Like many other decisions about the Mac, the answer appears to have derived from a mixture of ideology and practicality. Business machines didn't need color, and, besides, both color printers and displays were far too expensive.

Times have changed, though. Presentation graphics and desktop publishing have become major Mac applications, whereas replacing character-only terminals connected to minis and mainframes has not proven to be a popular reason for Mac ownership.

Color, instead of being a hallmark only of unbusinesslike game computers, turns out to be a feature that much of the desktop-computer working world can put to use. Few businesses have color photocopiers to reproduce color originals to circulate or file away, but most successful firms—including Apple—do use color in letterheads, sales letters, presentations, and proposals.

Color-output technology has developed in ways that were hard to anticipate. Color laser printers may still be a year or two off, but most other printing technologies seem to be offering color as an option. You can get color thermal printers, color ink-jet printers, and inexpensive color plot-

STEVE CAMPBELL

ters. Even Apple's own ImageWriter II dot-matrix impact printer, intended for use with both the Apple II and Macintosh lines, can produce four-color output when you use it with the optional color ribbon.

Unfortunately, color-video displays have yet to make as dramatic an improvement. A color display that can show the Mac's full 342 × 512-pixel display is still a rarity, because that kind of color resolution is still quite expensive. Not all Macintosh applications that can benefit from color need an on-screen, full-color, full-size display, so if you're willing to temporarily compromise on at least one feature, you can find a solution at a reasonable cost.

Two Approaches

Any general approach to color on the Mac has to take into account the Macintosh's two different approaches to graphics creation, "paint" images and "draw" or "object-oriented" graphics.

"Paint" images, such as those MacPaint and FullPaint from Ann Arbor Softworks create, are made up of the video rendition of a memory bit map, meaning that what you see on the screen is literally a bit-by-bit copy of a data pattern stored away in memory. This approach requires allocation of one bit of memory for each point that appears on the screen. Multiple bits per point are necessary if the system is also going to keep track of color or intensity, but the system can then color each point independently of its neighbors.

QuickDraw, the graphics routines in the Macintosh ROMs, can theoretically keep track of 32 bits for each point, which could give you literally billions of shades and colors, if only you had the 32 times the 21.375K necessary for a monochrome bit map, or some 684K of memory space just for the screen. You'd also need a lot of patience or a very fast Mac—many of the QuickDraw routines would slow down to a 32nd of their speed if they had to do all their current work and keep track of a full complement of color information at the same time.

"Draw" or object-oriented documents created by programs such as MacDraw, MacDraft, and most layout programs, on the other hand, save a compact description of each on-screen object in memory, with each object possibly comprising hundreds of points. Because each object is stored separately from the resulting screen image, you can stack up objects on top of each other; uncover objects from the bottom of a pile; and stretch, erase, or replicate them.

Each object in this approach stores with it a group of attributes: typically its shape, any pattern in use when it was drawn or filled, and its relative position vs. other overlapping objects. In a color system, color is just another of these stored attributes.

You don't get to choose an individual color for each point this way (unless you make each point an object), but for a small-to-reasonable number of objects, adding color doesn't add more processing time, and the total memory requirement is less than it is with the "paint" approach. The Mac's ROM routines can handle color objects, but that information isn't apparent, because of the computer's lack of a color monitor.

Color on Screen

For paint images, although you can't currently put color images into and get them off the Macintosh's screen, no rule says you can't store

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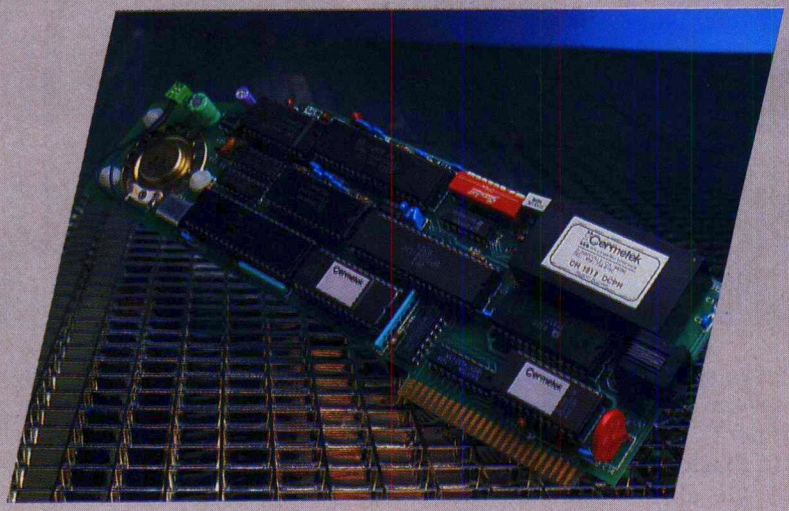

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CIRCLE 320 ON READER SERVICE CARD

that information separately.

That's what Dunn Instruments does with its Dunn Color Macintosh System. It's essentially a specialized color-drawing box that duplicates the Macintosh on-screen drawing (or really painting) process, in color. You keep the Macintosh interface and the MacPaint program you already know how to use, but at the same time you're running what is essentially a linked but independent drawing system. It even has a built-in film recorder to produce color slides directly from the color image.

You can also add color sequentially, instead of in parallel. For example, with the MacColor system from Axonix, you draw normally on the Macintosh and then "print" out the results to the firm's MGS 2 paintbox system. The unit has its own mouse, processor, and screen, and once you've loaded the image, you can work away on it with no further need of the Mac.

In still another approach, the screen image itself provides the starting point, and you add color on the fly. Using a Mentauris video adapter to get a video signal out from the Mac, Beck-Tech adds a box that derives a color image. Beck-Tech's Chromatron uses any dot patterns in the Mac's video image to determine a corresponding color. By setting the dot pattern in a region on the monochrome Mac screen, you can select from 16 basic colors for Chromatron output. The Chromatron also adapts the Mac's nonstandard video to standard (NTSC) form, so you can show it on an ordinary monitor or record it on a VCR.

Software Solutions

These color-video solutions are all fairly pricey (typically two to four times the cost of the Macintosh itself), although for businesses that need color video, they are often quite a bargain compared to the previous or non-Macintosh alternatives. But for many of us, the effort to achieve Macintosh color probably involves one of the following color-output software approaches.

You can rewrite software such as MacPaint to handle color. That's what Softstyle essentially did in its Colormate package. You can't actually see the color on the screen, but you can work with patterns and a ColorBits mode that shows which dots will be what color.

Softstyle is also one of several firms that are making output drivers for color printers. Its new Printworks for the Mac runs from the standard Apple and File menus. Before you print any application that uses standard built-in patterns, you choose the output colors for the patterns. When you print the result, you get a correspondingly colored document.

The big advantage of this method is that a large amount of existing Macintosh software already uses patterns and objects. You can thus turn programs such as Filevision and MacDraft into multispectral wonders with only a little extra effort. This approach also works with programs such as Microsoft BASIC that properly use the QuickDraw color routines.

Along with colorizing existing applications, another approach is to write new software that includes color abilities right from the start. Some programs such as Cricket Graph from Cricket Software produce ordinary Macintosh output on a LaserWriter or black-only ImageWriter but allow color output with a color ImageWriter or several other printers and plotters. Cricket Graph, which is a presentation-graphics system for making quick charts or sprucing up the output of programs such as Excel and Jazz, works with more than a dozen different color-output devices.

Monochrome Need Not Apply

More than half of the IBM PCs sitting on office desktops have only monochrome screens. Most terminals for multiuser computers also sport only a single color. Does the Macintosh really need to be able to work with multiple shades and hues?

Obviously, not in every application. But if you look at the Apple II series, the Amiga, and even the Atari ST series—or at color TV, color snapshots, or color telephones—it's clear that a lot of people care about color.

The Mac's edge in resolution, moreover, is fast vanishing. For presentation graphics, competing models are now offering resolution that's just as good, with color output. Soon, they will have software that incorpo-

Zimco International

85-39 213th Street, Queens Village, NY 11427

References: Barclays Bank of NY (718) 454-1900. D&B #130151913.

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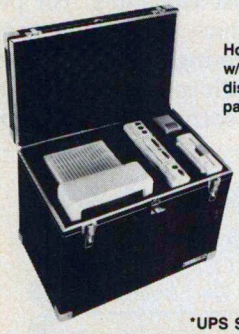

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rates many features imitating the Macintosh.

Furthermore, for the Macintosh to keep its lead in affordable desktop-publishing applications, it will need to have the ability to do color separations (dividing color images into the four component images needed for printing), as well as color layout and design.

Consequently, I don't see it as a question of whether we will see a color Macintosh or even when—it's a question of how fast, how good, and when we will notice that it's already here. ✚

The ever-colorful Steve Rosenthal regularly draws upon his background as a user of a spectrum of computers to fill this column for A+.

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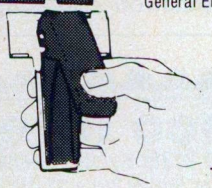

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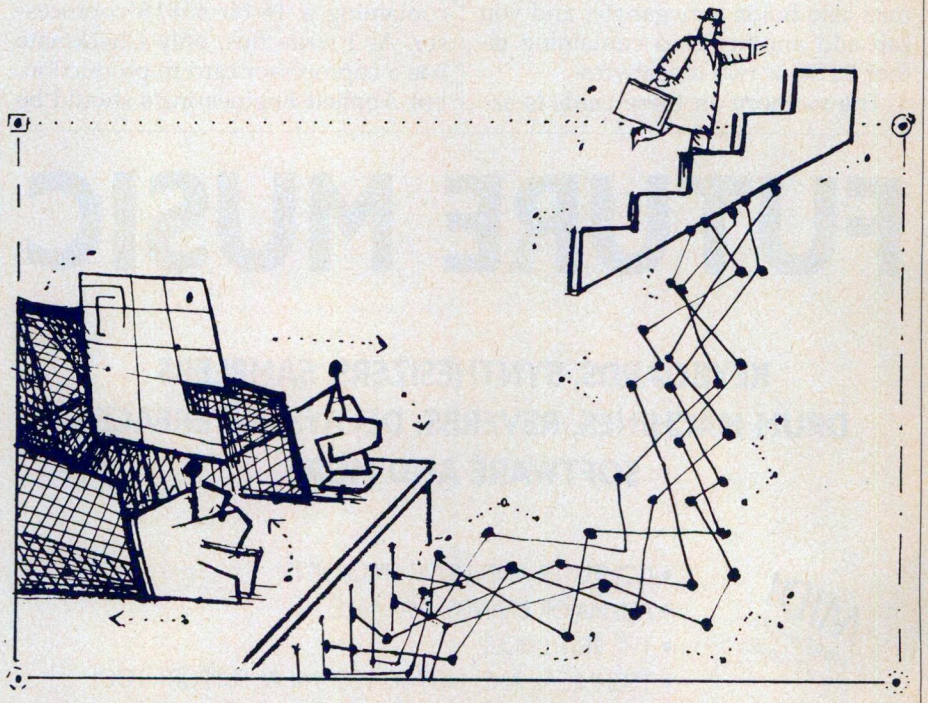

IIc HI-RES GRAPHICS DUMP

Q. *I have used an Apple IIe at work for quite some time, and I've now purchased a IIc for home use. One of the things I've noticed the IIc can't do is accept a simple command to dump the high-resolution-graphics screen to the printer. Is it easy to write an Applesoft program to do this?*

A. You're right. The ROM in the IIc that controls the printer port contains no commands for sending a graphics image to the printer. This absence of commands shouldn't be too surprising, since none of Apple's own IIe printer-interface cards have ever worked with such commands: the Parallel Printer Card and the Super Serial Card, for example, work with commands that affect the printing of text only.

Writing your own program to dump graphics on a printer is not easy. First you have to figure out how a graphics image is represented in memory. Then you have to study your printer manual to see how to print each of the 192 lines on the high-resolution-graphics screen onto the paper. The last step is the killer.

Instead of tackling your project yourself, why not take advantage of someone else's work? Roger Wagner Publishing, Inc. (10761 Woodside Avenue, Santee, CA 92071) sells an excellent graphics-printing program called Printographer that works with more than 100 different printers. With it, you can also crop your images to size and invert, magnify, and rotate them. It's an extremely useful program, especially if you have an oddball printer and you're using a drawing program that does not work with it. MousePaint, for example, works only with the ImageWriter. If you don't have an ImageWriter, you can print your masterpiece by first saving it to disk and then running Printographer.

Madwest Software (2014 Chamberlain, Madison, WI 53705) offers a graphics-dump program called Amperdump, which you can add to your Applesoft programs. American Eagle Software (P.O. Box 46080, Lincolnwood, IL 60646) sells Zoom Graphix, also a graphics-printing program.

IIc MINI-ASSEMBLER

Q. *I've just bought a IIc, and I'm trying to teach myself assembly-language programming. I've heard about the mini-assembler built into the IIc, but I can't figure out how to access it.*

A. First a warning: Not all IIc computers contain Apple's "born-again" mini-assembler. I say *born-again* because the mini-assembler was included in the ROMs of the original Apple II in 1977 but was not built into the II Plus or the original IIe or IIc. When Apple enhanced the IIe in May 1985 (see "A Close Look at Recent IIe Enhancements" in the August 1985 issue of *A+*, pages 45–54), the mini-assembler was put back into the ROM. The IIc received its own mini-assembler when its ROMs were upgraded in late 1985 to work with the new UniDisk 3.5 disk drive.

The easiest way to see if you have a mini-assembler in your IIe or IIc ROMs is to first enter a CALL –151 command from Applesoft to enter the system monitor. When you see the * prompt, type ! followed by RETURN; if the prompt becomes a !, the mini-assembler is present and you can start entering lines of assembly language. To leave the mini-assembler, press Return at the beginning of a line.

You can also examine certain identification bytes in the IIe and IIc ROM to determine if you have the new ROMs containing the mini-assembler. On the IIe, look for a $EO at $FBCO, and on the IIc, look for a $00 at $FBBF. If, instead, you read $EA and $FF, respectively, you're using the original ROMs, and you're out of luck until you upgrade.

ONE-MEGABYTE EXPANSION

Q. *I've seen lots of advertisements recently for memory cards I can use to expand my computer's memory to one megabyte or more. Which do you recommend purchasing?*

A. Three different techniques are currently possible for expanding your IIe to a megabyte (or more) of random-access memory.

MACIEK ALBRECHT

First, you can throw out your standard 80-column text card and use a card such as Checkmate's MultiRam or Applied Engineering's RamWorks II in your auxiliary slot. The new version of MultiRam holds one megabyte of memory on the board itself; you can add up to three megabytes later by piggybacking another memory board to it. The main RamWorks card also holds a megabyte, and you can add another card containing either 512K or two megabytes.

The memory on these cards is arranged as a series of 64K banks of auxiliary memory, any of which can replace the 64K of main memory on the IIe motherboard with the flick of a software switch. Both these cards also have RGB (red-green-blue) video options so that your Apple works nicely with RGB color monitors. Another nice feature is a coprocessor connector to which you can attach a card containing a 16-bit 65816 coprocessor. As I write this, only Checkmate has a coprocessor card in production, but Applied Engineering's should be available very soon. Rumor has it that the 65816 is the chip Apple will use in the next II-series model.

Second, you can use a card comprising a series of 16K banks that are functionally identical to the bank-switched "language" memory on the IIe motherboard. Examples of these cards are the Legend Industries S' Card and the Big Board available from the A.P.P.L.E. Co-op.

The third type of card is one such as the new one-megabyte Apple Memory Expansion Card. It also plugs into an I/O slot, but the computer does not access the card with bank-switching techniques. Instead, you read it or write to it by treating it like one big disk file: First you tell the card the starting position for an I/O operation, and then you start it reading or writing, one byte at a time. As the card reads or writes, a position pointer on it is automatically incremented. AST Research makes a similar card called the SprintDisk; the only apparent difference is that you can expand it to two megabytes.

The decision about which card to buy depends on a variety of factors. First, look at the type of software that comes with the memory card. Expect to receive a program that modifies AppleWorks to increase its desktop size and the size of the files that it can use; a RAMdisk program that can work with ProDOS, DOS 3.3, Pascal, and CP/M; a memory-testing program; and a disk-caching program. (A disk-caching program speeds up disk I/O by keeping disk blocks that a program often reads in memory. When a program needs information from a cached block, the disk is not accessed; the block of information simply transfers from RAM.)

Other factors are the quality of the card (some manufacturers offer five-year warranties!); the software-upgrade policy (remember that every time a new version of AppleWorks appears, you'll need a new desktop-extender program); the expandability; and, of course, the price.

In my view, given equivalent software, the best type of memory card to buy is the type that plugs into the auxiliary slot. I say this because it means you don't have to use up a valuable I/O slot—you're using the auxiliary slot anyway. Apple's release of its new one-megabyte card indicates that the company obviously disagrees with me. I'm sure we can both live with our opinions, though.

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AN APPLE FOR A SONG

Q. *A friend and I are writing a program for the IIe and want to use the Apple's speaker to play a song. We can't do it with Applesoft commands because we can't click the speaker fast enough. Where can we locate an assembly-language routine that will help us?*

A. The command for making the speaker click from Applesoft is PEEK (49200). To generate a musical note, of course, you have to click the speaker at a fixed rate for a period of time, which isn't easy to do in a high-level language such as BASIC. So you're right, you do need to take advantage of low-level assembly-language techniques to generate precise, pure tones.

A commercial program that will help you is The Wizard's Toolbox from Roger Wagner Publishing, Inc. (10761 Woodside Avenue, Santee, CA 92071). With the Toolbox you can add a variety of new commands to Applesoft, including one called TONE that generates a pure tone of a given pitch and duration. Once you've installed the Toolbox assembly-language subroutines that you want to use, you use them with a command such as

```
&"TONE",P,D
```

where P is a number representing the pitch (frequency) of the tone and D is a number representing its duration, in hundredths of a second. The & is an Applesoft command used to link your Applesoft program to the assembly-language subroutine that defines TONE. The Wizard's Toolbox also contains a SOUND command for generating wild sound effects on the Apple's speaker.

If you're interested in the theory of how music is generated on the Apple II or in how to write your own tone-generation program, refer to either of my two reference books, *Inside the Apple IIc* and *Inside the Apple IIe* (1985, Brady Communications).

PROBLEMATIC STACKING

Q. *I have an Apple IIe with two disk drives. When I stack my monitor on top of the disk drives, irregular things happen to my programs. Programs bomb, and disks won't format. What's going wrong?*

A. The problem arises because the monitor emits radio-frequency interference (RF) and the disk drives are not adequately shielded. Your programs may bomb because the RF

When I stack my monitor on top of the disk drives, irregular things happen to my programs.

causes problems while the disk-drive head reads data from the disk. Likewise, problems with formatting a disk may be caused by RF interference when the disk-drive head writes data to a disk.

There are several solutions to this problem:

1. Place the monitor and the disk drives further away from each other.
2. Try using a good-quality shielded cable between your monitor and computer.
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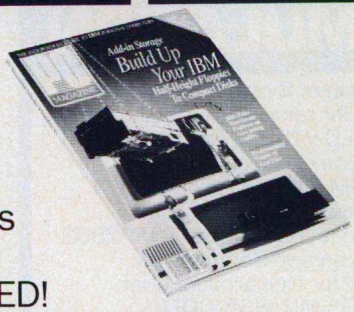

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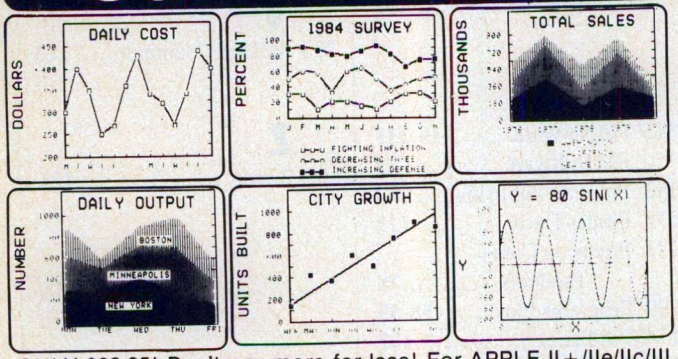

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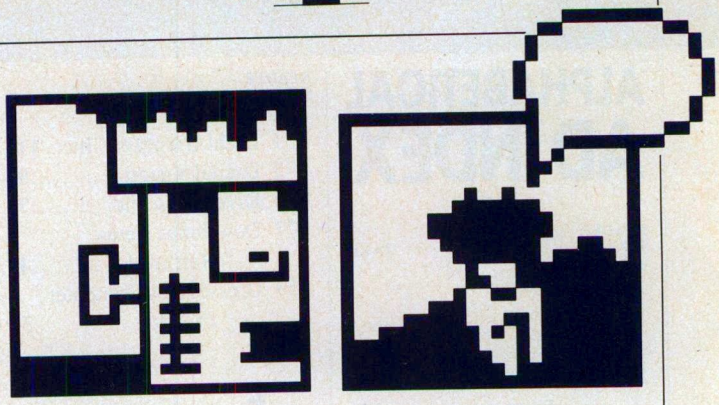

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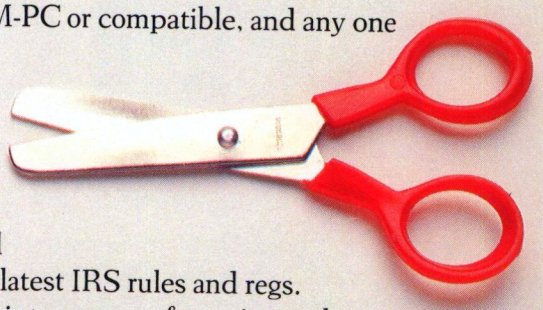

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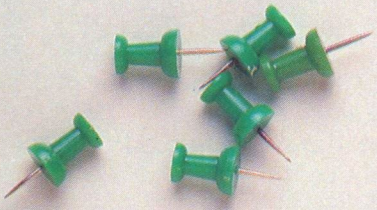

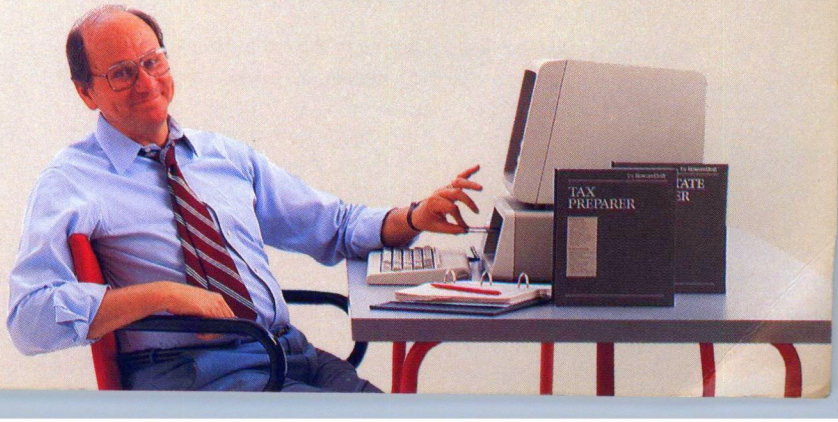

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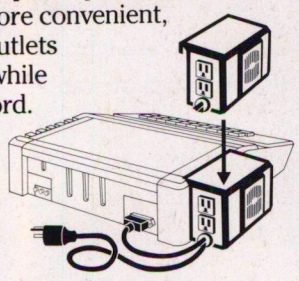


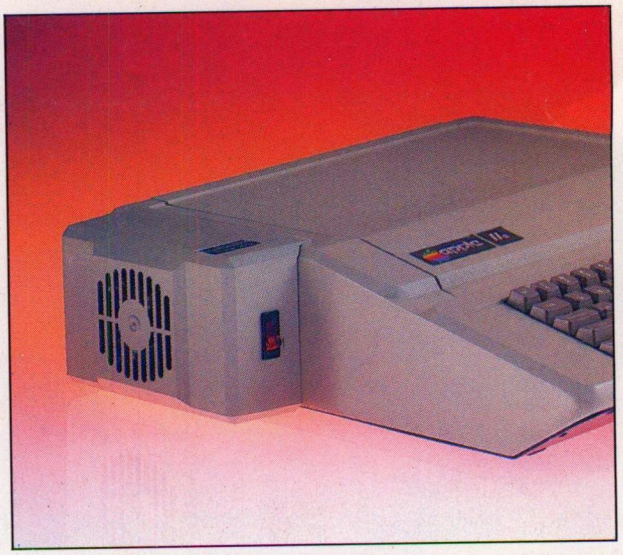
System Saver solves power line problems.

Impurities in the power supply cause 70-90% of all microcomputer malfunctions. Line noise can be interpreted as data, confusing your Apple and causing annoying system errors. Power surges and spikes can do costly damage to your computer's delicate circuitry.

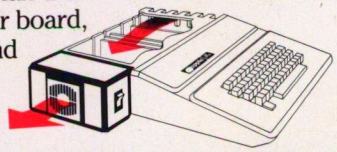
System Saver clips surges and spikes at a safe level and filters out line noise. It makes your Apple more accurate, more efficient and more reliable.

System Saver keeps your Apple cool.

Peripheral cards added to your Apple not only generate heat, they block any natural air flow through the computer. The resulting high temperature conditions can potentially shorten the lives of both your Apple and your peripheral cards.



System Saver's quiet fan draws a breath of fresh air across the Apple's mother board, over the power supply and out the side ventilation slots at the rate of 17 cubic feet per minute.



More than 1/4 million Apple owners think of System Saver as the piece Apple forgot. And 1/4 million well-protected Apples agree.

For a dealer near you, or to speak to a Kensington sales representative, call toll free (800) 535-4242 In NY (212) 475-5200.

KENSINGTON™

System Saver is UL Listed. System Saver's surge suppression circuitry conforms to IEEE specification 507 1980, Category A. Also available in 220/240 Volts, 50/60 Hz.

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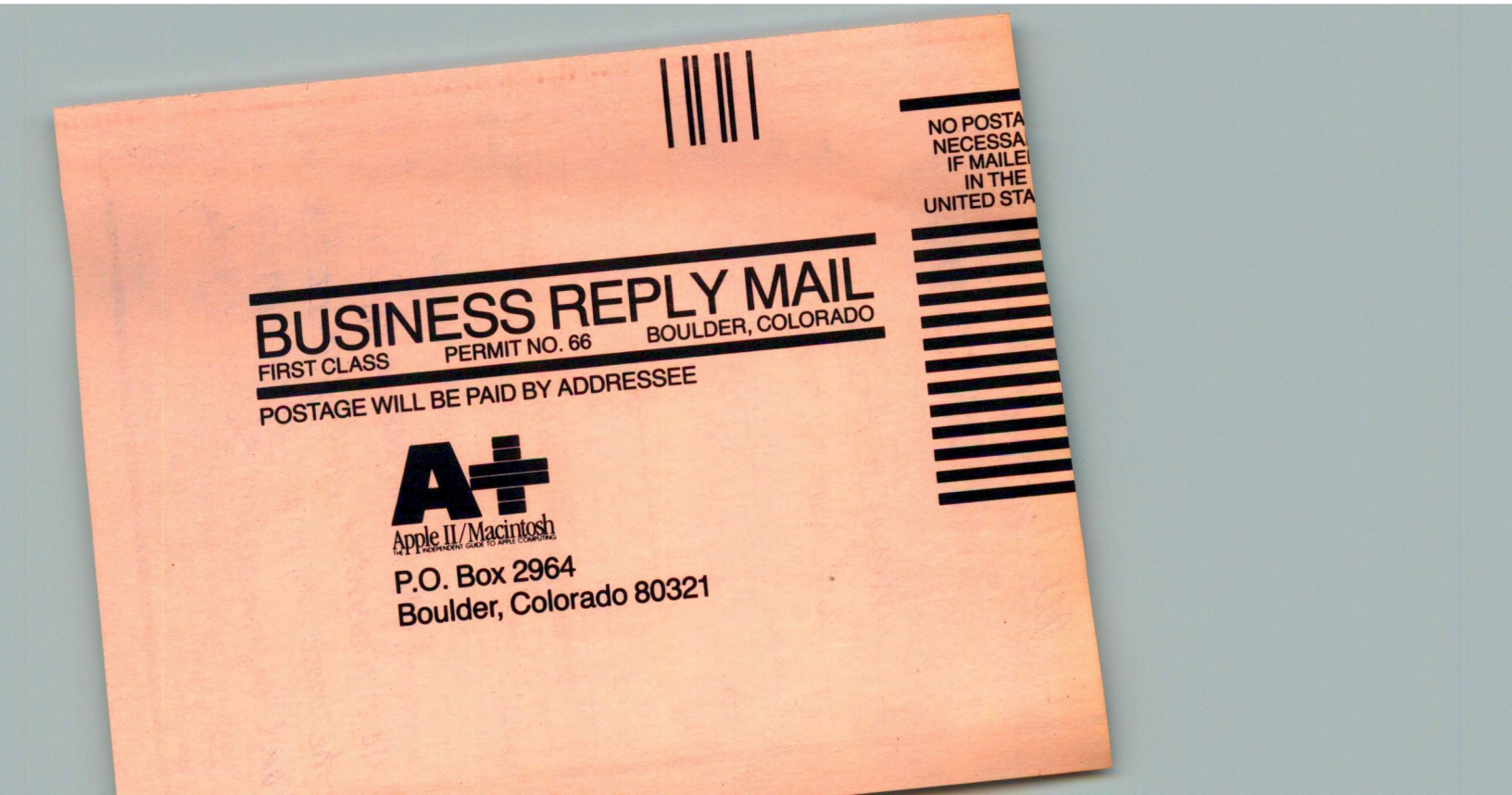
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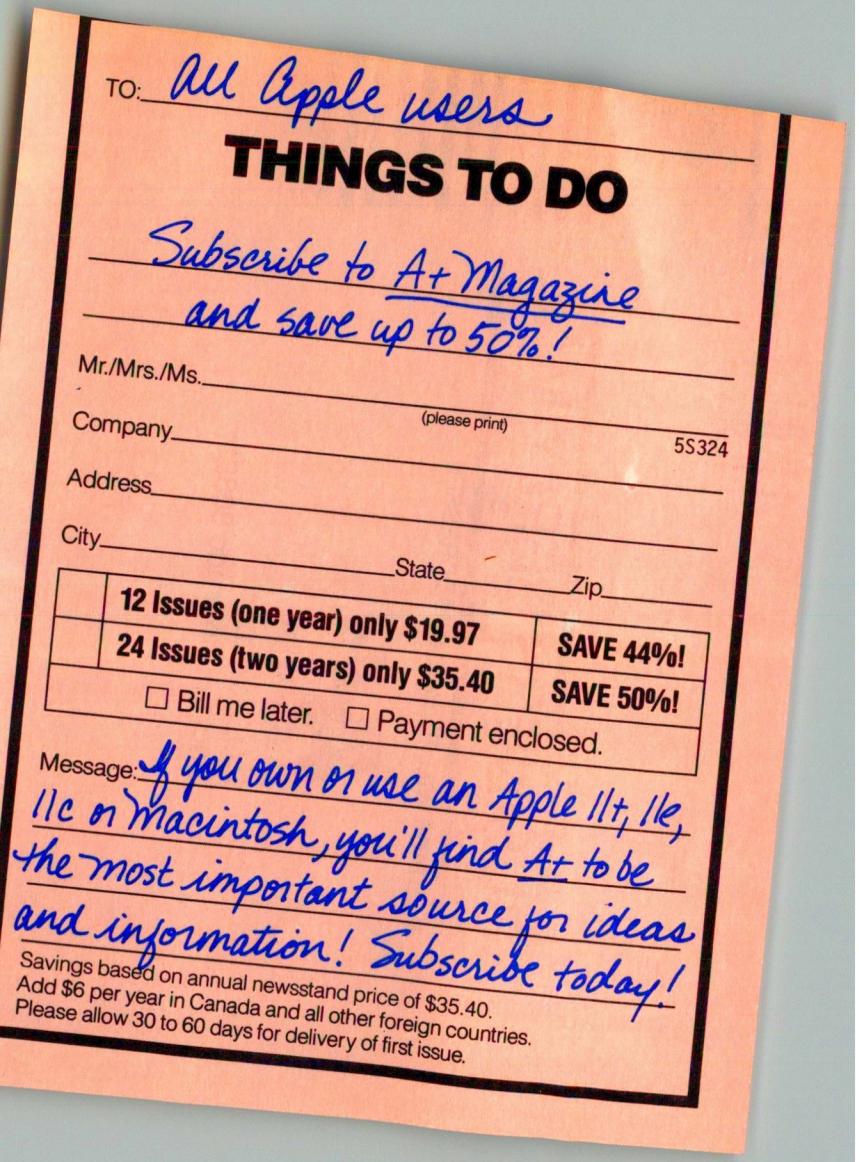

TO: All Apple users

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